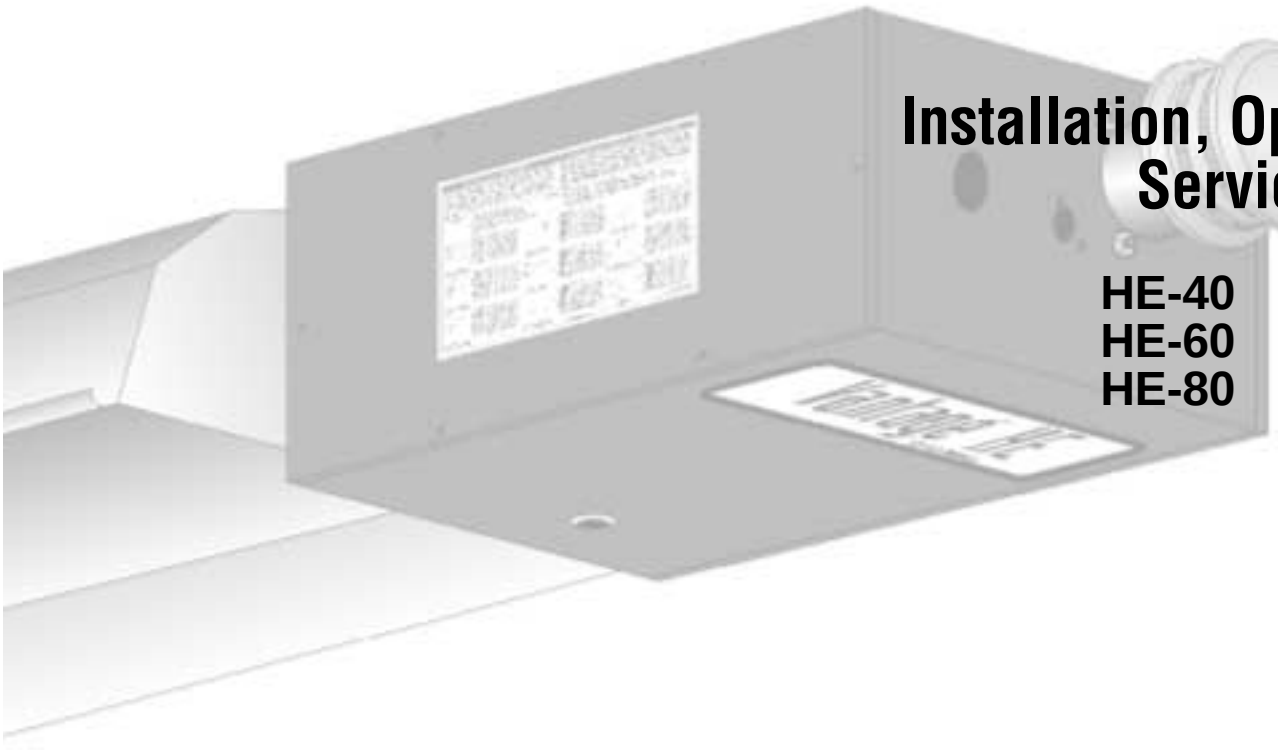
ROBERTS GORDON

Vantage® HE



Installation, Operation & Service Manual

HE-40
HE-60
HE-80

HE-100
HE-125
HE-150
HE-175

FOR YOUR SAFETY

If you smell gas:

1. Open windows.
2. DO NOT try to light any appliance.
3. DO NOT use electrical switches.
4. DO NOT use any telephone in your building.
5. Leave the building.
6. Immediately call your local gas supplier after leaving the building. Follow the gas supplier's instructions.
7. If you cannot reach your gas supplier, call the Fire Department.

Installer

Please take the time to read and understand these instructions prior to any installation. Installer must give a copy of this manual to the owner.

Owner

Keep this manual in a safe place to provide your serviceman with information should it become necessary.

DESIGN CERTIFIED

CERTIFIED

Quality in Any Language™

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▶Table of Contents

1 Warnings 1

Read this section carefully. Improper installation, adjustment, operation or maintenance will result in death, injury or property damage.

2 Introduction 2

Checking Shipment 2
Installer Responsibility 2

3 Planning 2

National Standards and Applicable Codes
- Gas Codes 2
- Aircraft Hangars 2
- Public Garages 2
- Electrical 3
- Venting 3
- Hazardous Locations 3

Critical Considerations 4
Installation Procedure 4

4 Clearances to Combustibles 5

5 Standard Parts List 8

Contents of Cartons 9

6 Assembly Overview 10

Overview Key 10
10 ft. Layout 11
20 ft. Layout 11
30 ft. Layout 12
40 ft. Layout 13
50 ft. Layout 14
60 ft. Layout 15

7 Component Installation 16

Coupling Assembly 16
Tube Clamp Package 16
Reflector Support Package 16
Elbow Fitting Dimensions 17
Reflector End Cap 17
Outdoor Hanging Detail 18
Typical Suspension Details 19
Turbulator Baffle Assembly Detail 19
Side Extension Reflector 20
U-Tube Package Assembly 21

8 Venting and Ducting 22

General Venting Requirements 22
Vent Length Requirements 22
Venting Options 23
Unvented Operation (Indoor) 24
Horizontal Venting 24
Common Side Wall Venting 25
Vertical Venting 26
Common Vertical Venting 27
Outside Combustion Air Supply 28
Outside Air Supply for two Heaters Controlled by one Thermostat 29

9 Gas Piping 30

Gas Line Connection 3

10 Wiring 31

Line Voltage Thermostat Wiring 31
Low Voltage Thermostat on One Burner 31
Low Voltage Thermostat and Relay Wiring 32
Electrical Connection - Outdoor 33
Electrical Connection to the Burner Box 33
Burner Ladder Diagram 34
Burner Internal Wiring 34

11 Operation 35

Sequence of Operation 35
Maintenance 35

12 Troubleshooting 36

Checking Manifold Gas Pressure 37
Troubleshooting Flow Chart 38

13 Replacement Parts 40

14 Engineering Specifications 41

15 General Specifications 42

16 Limited Warranty 43

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▶Section 1. Warnings

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow these instructions can result in personal injury or property damage:

1. Read this manual carefully before installing or servicing this equipment. Improper installation, service or maintenance can result in death, injury or property damage.
2. Check clearances given on the outside of each burner to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician or representative.
4. All service must be performed only by a trained service technician or representative.
5. After installation is complete, check product operation as provided in these instructions.

Combustibles: Failure to maintain the specified minimum clearances to combustibles could result in a serious fire hazard. Do not locate flammable or combustible materials within this distance. Signs should be posted in storage areas to specify maximum stacking height to maintain required clearances to combustibles. Do not locate in hazardous atmospheres containing flammable vapors or combustible dust. **United States:** Installations in public garages or airplane hangars are permitted when in accordance with ANSI Z83.6 and NFPA-409 and 88 Codes. **Canada:** Installation in public garages is permitted when in accordance with CAN/CGA B.149.2. Installation in airplane hangars is permitted when in accordance with the requirements of the enforcing agency.

Vehicles: Minimum clearances must be maintained from vehicles parked below the heater. Ensure that adequate clearance is maintained where vehicle lifts are in operation.

Gas Connection: There is an expansion of the radiant pipe with each firing cycle, and this will cause the burner to move with respect to the gas line. This can cause a gas leak resulting in an unsafe condition if the gas connection is not made strictly in accordance with Figure 27 of these instructions.

Ignition: This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

Mechanical Hazard–Suspension: Use appropriate suspension hardware, beam clamps (rod or perforated strap) and turnbuckles at predetermined locations. The weight and normal movement of the heating system may cause support failure if the following minimum suspension requirements are not met: distance between supports must be 10 ft. (3 m) or less; chain must be general purpose proof coil steel chain, 3/16" (5 mm) or larger in Diameter, with a working load limit of a mimimum of 750 lbs. Failure of the

⚠WARNING

Failure to follow these instructions can result in personal injury or property damage:

Do not use in an atmosphere containing halogenated hydrocarbons or other corrosive chemicals. Some compounds in the air can be drawn into the equipment and can cause an accelerated rate of corrosion of some parts of the heat exchanger. The use of such chemical compounds in or near the enclosure should be avoided where a longer life of the burner, tubing and other parts is desirable.

Caution should be used when running the system near combustible materials such as wood, paper, rubber, etc. Consideration should be given to partitions, storage racks, hoists, building construction, etc. Figure 1 gives minimum acceptable clearances to combustibles.

If the building has a slight negative pressure or contaminants are present in the air, an outside combustion air supply to the heater is strongly recommended.

⚠ CAUTION

Failure to follow these instructions can result in damage to the system components:

Do not high pressure test the gas piping with the burners connected. Failure to follow this procedure will exceed the pressure rating of burner gas controls and this will require complete replacement of these parts.

This heater is designed for heating nonresidential indoor and outdoor spaces. These instructions, the layout drawing, local codes and ordinances, and applicable standards that apply to gas piping, electrical wiring, venting, etc., must be thoroughly understood before proceeding with the installation.

⚠WARNING

Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the installation, operation and service manual thoroughly before installing or servicing this equipment. For assistance or additional information, consult a qualified installer, service agency or your gas supplier.

FOR YOUR SAFETY:

Do not store or use gasoline or other flammable objects, liquids or vapors in the vicinity of this heater or any other appliance.

▶Section 2. Introduction

Roberts-Gordon pioneered low-intensity infrared heating systems in 1962 with the introduction of its revolutionary custom-engineered CORAYVAC® system. In 1973, Roberts-Gordon expanded its product offering to include unitary heating systems. The VANTAGE® product line was first introduced to North America in 1987 and since its inception, the product has been setting the standard in unitary infrared heating.

The VANTAGE® HE, introduced in 1998, is a non-condensing, field assembled unitary heating system that is approved for outdoor and indoor installations. Easy to install, this system requires minimal maintenance and is effective in moist or mildly caustic environments due to extensive use of corrosion resistant components. It is designed to provide years of economical operation and trouble-free service.

Checking Shipment

Check the shipment against the Bill of Lading for shortages. Also, check for external damage to cartons. Note any shortages, and/or external damage to cartons on the Bill of Lading in the presence of the carrier. The carrier should acknowledge any shortages or damage by initialing this “noted” Bill of Lading. Immediately report any claims for damaged material, or shortages that were not evident at the time of shipment, to the carrier and your Roberts-Gordon Factory Representative.

Installer Responsibility

All heaters and associated gas piping should be installed in accordance with applicable specifications and this installation made only by firms (or individuals) well qualified in this type of work. Consult local Building Inspectors, Fire Marshals or your local Roberts-Gordon Representative for guidance.

VANTAGE® HE heaters are installed on the basis of information given in a layout drawing, which together with the cited codes and regulations, comprise the basic information needed to complete the installation. The installer must furnish all needed material that is not furnished as standard equipment. It is his responsibility to see that such materials, as well as the installation methods he uses, result in a job that is workmanlike and in compliance with all applicable codes.

The VANTAGE® HE heater has been extensively tested under extreme conditions and is highly resistant to the outdoor elements. Care must be taken to design the proper hanging brackets and suspension (see Figure 14b) of the unit in high wind areas; care must also be taken to keep the burner section out of the direct spray of pressure wash in a wash bay.

Roberts-Gordon Factory Representatives have had training and experience in the application of this equipment and can be called on for suggestions about installation which can save material and money.

▶Section 3. Planning

The following codes and instructions should be followed when planning the installation of the heater. In addition to these instructions, the warnings in Section 1 must be carefully adhered to since improper installation can result in death, injury or property damage.

National Standards and Applicable Codes

Gas Codes

The type of gas appearing on the nameplate must be the type of gas used. Installation must comply with local codes and recommendations of the local gas company. **United States**: Refer to NFPA-54/ANSI-Z223.1 - latest revision, National Fuel Gas Code **Canada:** Refer to CAN/CGA B149.1 and B149.2:

Installation Codes for Gas Burning Appliances.

- Clearance between the heater/vent and adjacent combustible material (which is part of the building or its contents) shall be maintained to conform with the above listed codes.

Aircraft Hangars

Installation in aircraft hangars must be in accordance with the following codes: **United States:** Refer to Standard for Aircraft Hangars, ANSI/NFPA-409 - latest revision. **Canada:** Refer to Standard CAN/CGA B149.1 and B149.2.

- Heaters in aircraft storage or service areas shall be installed a minimum of 10 ft. (3 m) above the upper surface of wings or engine enclosures of the highest aircraft which may be housed in the hangar. (This is measured from the bottom of the heater to the wing or engine enclosure, whichever is highest from the floor.)
- In other sections of aircraft hangars, such as shops or offices, heaters must not be installed less than 8 ft. (2.4 m) above the floor.
- Heaters installed in aircraft hangars shall be located to avoid damage by aircraft, cranes, movable scaffolding or other objects.

Public Garages

Installation in garages must be in accordance with the following codes: **United States**: Standard for Parking Structures NFPA-88A - latest revision or the Standard for Repair Garages, NFPA 88B - latest revision. **Canada**: Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances.

Electrical

⚠ WARNING

Electrical Shock Hazard

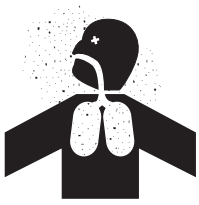
Heater must be installed and grounded according to national codes.

Failure to follow these instructions can result in death or electrical shock.

The heater must be electrically grounded in accordance with the following codes: **United States**: Refer to National Electrical Code, ANSI/NFPA-70 - latest revision. Wiring must conform to the most current National Electrical Code, local ordinances, and any special diagrams furnished. **Canada**: Refer to Canadian Electrical Code, CSA C22.1 Part 1 - latest revision.

Venting

⚠ WARNING



Carbon Monoxide Hazard

Heaters installed unvented must be interlocked with sufficient building exhaust.

Heaters must be installed according to the installation manual.

Failure to follow these instructions can result in death or injury.

The venting must be installed in accordance with the following codes: **United States**: Refer to NFPA-54/ANSI-Z223.1 - latest revision, National Fuel Gas Code.

Canada: Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances.

Partial information with regard to these codes is provided in Section 8 of this installation manual with regard to size and configurations for venting arrangements.

Any portion of vent pipe passing through a combustible wall must be dual insulated and have an approved thimble to conform with above listed codes.

Hazardous Locations

⚠ WARNING

Fire Hazard

Some objects will catch fire or explode when placed close to heater.

Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.

Failure to follow these instructions can result in death or injury.

Burn Hazard

Keep all persons, especially children, away from heater.

Do not touch any part of the heater.

Heater is very hot.

Failure to follow these instructions can result in severe injury.

⚠ ATTENTION

Risque d'incendie

Certains objets placés près du radiateur peuvent s'enflammer ou exploser.

Tenir tous les objets, liquides et vapeurs inflammables à la distance de sécurité requise du radiateur.

Le non-respect de ces consignes peut causer mort, blessures ou dommage matériel.

Risque de brûlure

Ne laisser personne, en particulier des enfants, s'approcher du radiateur.

Ne toucher aucune partie du radiateur.

Le radiateur est brûlant.

Le non-respect de ces consignes peut entraîner des blessures graves.

Where there is the possibility of exposure to combustible airborne material or vapor, consult the local Fire Marshall, the fire insurance carrier or other authorities for approval of the proposed installation.

Critical Considerations

⚠ WARNING

Fire Hazard

Some objects will catch fire or explode when placed close to heater.

Keep all flammable objects, liquids and vapors the required safe distances away from heater.

Failure to follow these instructions can result in death, injury or property damage.

⚠ ATTENTION

Risque d'incendie

Certains objets placés près du radiateur peuvent s'enflammer ou exploser.

Tenir tous les objets, liquides et vapeurs inflammables à la distance de sécurité requise du radiateur.

Le non-respect de ces consignes peut causer mort, blessures ou dommage matériel.

The Vantage® HE is a suspended heater. Therefore, its stability, flexibility, and safety are very important. Before starting installation, be sure the system can meet the following requirements:

- Maintain specified clearances to combustibles, and safe distance from heat-sensitive material, equipment and work stations.
- Provide a suspension with vertical length of chain or swinging rod which has at least 2" (5 cm) of horizontal travel for each burner in a straight run. Be sure the suspension system is sufficiently flexible to accommodate thermal expansion which occurs as the system heats up (see Figure 15).
- Outdoor hanging: Chain should not be used when installing the unit outdoors. Use a suspension system which minimizes the lateral movement or swing which might damage reflectors. See Figure 14b for further details.
- Washbays: The VANTAGE® HE unit must not be exposed to the direct spray from a pressure washer.
- Provide access to burners for servicing, preferably on both sides, above, and behind for burner removal.
- Be sure the heater has a downward pitch of 1/2" per 20 ft. (1 cm per 6 m) away from the burner.
- Provide signs in storage areas to specify maximum stacking height to maintain required clearances to combustibles.
- Plan location of supports. Locate a support near all elbows.
- A minimum of 10 ft. (3 m) on HE-60/80 and a minimum of 15 ft. (4.6 m) on HE-100/125/150/175 is required between the burner and the first elbow.

Installation Procedure

⚠ WARNING

Several steps are involved in the installation of the heater.

Do not attempt to operate the heater until all steps of the installation have been accomplished.

Failure to follow these instructions can result in death, injury or property damage.

Take maximum advantage of the building's upper structure, beams, joists, purlins, etc., from which to suspend the heater. There is no unique sequence for installation of the tubing. On-site observation will usually reveal a logical sequence. Begin the installation at the most critical dimension. This could save time. Watch for swinging doors, overhead cranes, car lifts, etc. Reflectors and tubing can be installed as you move along. Carefully adjust system pitch at each position to level the heater. Pitch down 1/2" per 20 ft. (1 cm per 6 m) away from burner.

Outdoor Mounting: The VANTAGE® HE unit is meant for stationary mounting in all situations and should not be suspended from any structure which may become mobile or from any organic structures such as a tree. Clearances to combustibles must be maintained in all cases; do not install heaters in a location such as a parking area, where a vehicle with a painted or non-metallic upper surface, may be parked within the clearances to combustibles.

The bottom of the combustion air inlet shall not be less than 12" (30 cm) above a surface which could support snow, ice, or debris.

Do Not:

- Pressure test the gas line using high pressure (greater than 1/2 PSIG) without closing the high-pressure shutoff cocks. Failure to do so will result in damage to the burners.

Do:

- Familiarize yourself with local and national codes.
- Develop a planned procedure which will conserve material and labor on the job.
- Check to see that all material and equipment is on the job before starting installation.
- Allow for thermal expansion of the hot tube.
- Install the gas connector only as shown in instructions (see Figure 27).
- Have slip joints where required between reflectors to keep them from buckling or coming apart.

▶Section 4. Clearances to Combustibles

⚠ WARNING	
Fire Hazard **Some objects will catch fire or explode when placed close to heater.** **Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.** **Failure to follow these instructions can result in death or injury.**	**Burn Hazard** **Keep all persons, especially children, away from heater.** **Do not touch any part of the heater.** **Heater is very hot.** **Failure to follow these instructions can result in severe injury.**
⚠ ATTENTION	
Risque d'incendie **Certains objets placés près du radiateur peuvent s'enflammer ou exploser.** **Tenir tous les objets, liquides et vapeurs inflammables à la distance de sécurité requise du radiateur.** **Le non-respect de ces consignes peut causer mort, blessures ou dommage matériel.**	**Risque de brûlure** **Ne laisser personne, en particulier des enfants, s'approcher du radiateur.** **Ne toucher aucune partie du radiateur.** **Le radiateur est brûlant.** **Le non-respect de ces consignes peut entraîner des blessures graves.**

In all situations, clearances to combustibles must be maintained. Failure to observe clearances to combustibles will result in death, severe injury or property damage. Signs should be posted in storage areas to specify the maximum stacking height to maintain required clearances to combustibles. Minimum clearances must be maintained from vehicles parked below the heater. Caution should be used when running the system near combustible materials such as wood, paper, rubber, etc. Consideration should be given to partitions, storage racks, hoists, building construction, etc. Figure 1a-1h gives minimum acceptable clearances to combustibles.

NOTE: 1. All dimensions are from the tube surface.
2. Clearances B, C and D can be reduced by 50% for locations 25 ft. (8 m) or more downstream of the burner.

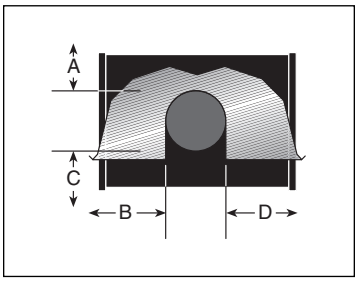


Figure 1a. Standard Reflector

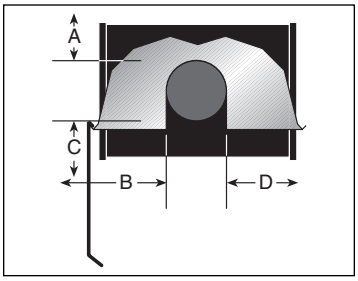


Figure 1b. One Side Reflector

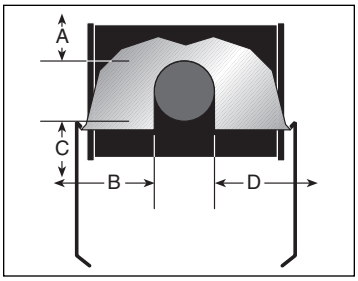


Figure 1c. 2 Side Reflectors

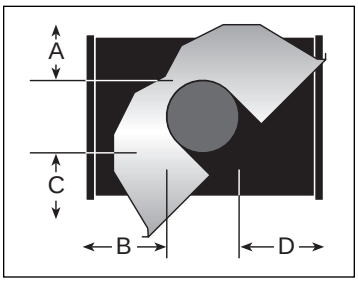


Figure 1d. 45° Tilt Reflector

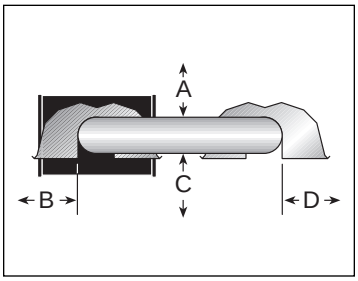


Figure 1e. U-Tube, Standard

Inches

Model	A	B	C	D
HE-40	6	27	53	27
HE-60	6	35	63	35
HE-80	6	38	66	38
HE-100	6	40	71	40
HE-125	6	46	77	46
HE-150	6	50	80	50
HE-175	8	52	82	52

Metric (cm)

Model	A	B	C	D
HE-40	15	68	133	68
HE-60	15	88	158	88
HE-80	15	95	165	95
HE-100	15	100	178	100
HE-125	15	115	193	115
HE-150	15	125	200	125
HE-175	20	130	205	130

Model	A	B	C	D
HE-40	6	9	53	44
HE-60	6	9	63	47
HE-80	6	9	70	54
HE-100	6	9	77	59
HE-125	6	9	83	65
HE-150	6	9	86	69
HE-175	8	9	88	73

Model	A	B	C	D
HE-40	15	23	133	110
HE-60	15	23	158	118
HE-80	15	23	175	135
HE-100	15	23	193	148
HE-125	15	23	208	163
HE-150	15	23	215	173
HE-175	20	23	220	183

Model	A	B	C	D
HE-40	6	15	53	15
HE-60	6	23	66	23
HE-80	6	25	72	25
HE-100	6	27	78	27
HE-125	6	32	84	32
HE-150	6	35	88	35
HE-175	8	40	91	40

Model	A	B	C	D
HE-40	15	38	133	38
HE-60	15	58	165	58
HE-80	15	63	180	63
HE-100	15	68	195	68
HE-125	15	80	210	80
HE-150	15	88	220	88
HE-175	20	100	228	100

Model	A	B	C	D
HE-40	8	8	51	46
HE-60	8	8	60	54
HE-80	8	8	66	60
HE-100	10	8	74	64
HE-125	10	8	78	69
HE-150	12	8	84	74
HE-175	12	8	85	79

Model	A	B	C	D
HE-40	20	20	128	115
HE-60	20	20	150	135
HE-80	20	20	165	150
HE-100	25	20	185	160
HE-125	25	20	195	173
HE-150	30	20	210	185
HE-175	30	20	213	198

Model	A	B	C	D
HE-40	-	-	-	-
HE-60	6	35	63	30
HE-80	6	38	69	37
HE-100	6	40	76	39
HE-125	6	46	79	43
HE-150	6	50	84	47
HE-175	8	54	87	51

Model	A	B	C	D
HE-40	-	-	-	-
HE-60	15	88	158	75
HE-80	15	95	173	93
HE-100	15	100	190	98
HE-125	15	115	198	108
HE-150	15	125	210	118
HE-175	20	135	218	128

NOTE: 1. All dimensions are from the tube surface.
2. Clearances B, C and D can be reduced by 50% for locations 25 ft. (8 m) or more downstream of the burner.

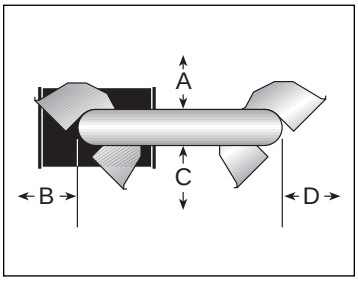


Figure 1f. U-Tube, Opposite 45°

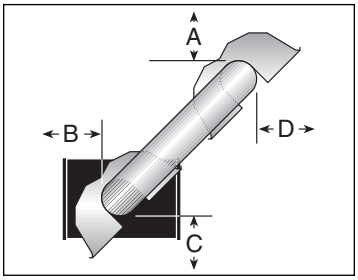


Figure 1g. U-Tube, Full 45°

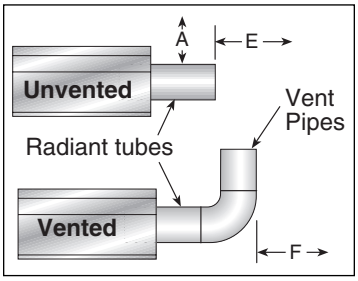


Figure 1h. Venting

Inches

Model	A	B	C	D
HE-40	-	-	-	-
HE-60	8	54	60	22
HE-80	8	60	66	22
HE-100	10	64	74	22
HE-125	10	70	78	22
HE-150	12	74	84	22
HE-175	12	76	85	22

Metric (cm)

Model	A	B	C	D
HE-40	-	-	-	-
HE-60	20	135	150	55
HE-80	20	150	165	55
HE-100	25	160	185	55
HE-125	25	175	195	55
HE-150	30	185	210	55
HE-175	30	190	213	55

Model	A	B	C	D
HE-40	-	-	-	-
HE-60	8	8	60	42
HE-80	8	8	66	46
HE-100	8	8	74	52
HE-125	8	8	78	61
HE-150	8	8	84	66
HE-175	8	8	85	70

Model	A	B	C	D
HE-40	-	-	-	-
HE-60	20	20	150	105
HE-80	20	20	165	115
HE-100	20	20	185	130
HE-125	20	20	195	153
HE-150	20	20	210	165
HE-175	20	20	213	175

Model	A	E	F
HE-40	14	18	18
HE-60	14	18	18
HE-80	20	24	18
HE-100	20	24	18
HE-125	20	24	18
HE-150	20	30	18
HE-175	20	30	18

Model	A	E	F
HE-40	35	45	45
HE-60	35	45	45
HE-80	50	60	45
HE-100	50	60	45
HE-125	50	60	45
HE-150	50	75	45
HE-175	50	75	45

▶Section 5. Standard Parts List

The following section provides information about assembling VANTAGE® HE heaters. The heaters must be assembled according to the following illustrations and tables in order to ensure safe and proper operation.

VANTAGE® HE burner carton contains the Basic Burner Unit, a Pipe Nipple, Turbulators (when required) and Flex Gas Line for gas connection.

Tubes, reflectors, hangers, etc. are prepackaged at the factory. These components are assembled in one carton for heaters up to 40 ft. (12 m) in length. For heaters 50 ft. (15 m) and 60 ft. (18 m) in length, the components are packaged in two cartons. One carton will include a transition tube that is attached to the burner unit. A few minor components, such as end caps, may be duplicated.

An additional Vent Cap Package is included with all VANTAGE® HE heaters. This package includes a vent adapter and two vent caps and is required for outdoor installation. It is optional when installing the heater indoors, but may be used if desired. See Figure 21 for outdoor layout and also refer to the Venting Sections for further details.

Complete details of components in each carton are shown in Table 2.

Figures 7 through 18 show specific assembly details. Refer to Section 8 for venting assembly, Section 9 for gas piping assembly, and Section 10 for field wiring.

Table 1. VANTAGE® HE Model/Tube Length

Model	Tubing Length	For Assembly see page
HE-40	10' (3 m)	pg 11
HE-60	20' (6 m)	pg 11
HE-80	20' (6 m)	pg 11
HE-100	30' (9 m)	pg 12
HE-125	40' (12 m)	pg 13
HE-150	50' (15 m)	pg 14
HE-175	60' (18 m)	pg 15

Table 2. Contents of VANTAGE® HE Cartons

Part No.	Description	HE-40	-60	-80	-100	-125	-150	-175
	HE Burner Assembly (rate and fuel varies)	1	1	1	1	1	1	1
Burner Package Contents								
91412204	Vinyl Coated Stainless Steel Flex Gas Connector-3/4"NPT	1	1	1	1	1	1	1
132100NA	Operation, Installation & Service Manual	1	1	1	1	1	1	1
	Bag (Pipe Nipple and Hardware)	1	1	1	1	1	1	1
02568200	Gasket, Burner to Transition Tube	1	1	1	1	1	1	1
	Turbulator Assembly - 5 ft. (1.5 m) (2 pcs.)	-	-	-	1	-	-	-
	Turbulator Assembly - 7 ft. (2 m) (3 pcs.)	1	-	-	-	-	-	-
	Turbulator Assembly - 10 ft. (3 m) (5 pcs.)	-	1	1	-	-	-	-
Component Package Contents								
91409408	Tube, HT Aluminized - 10 ft. (3 m)	-	1	1	2	3	2	2
03051101	Transition Tube, ALUMI-THERM® Steel 10 ft. (3 m)	-	1	1	1	1	1	1
03051601	Transition Tube, HT ALUMI-THERM® Steel 10 ft. (3 m)	1	-	-	-	-	-	-
01312700	Stainless Steel Coupling Assembly	-	1	1	2	3	2	2
027503SS	Stainless Steel Reflector - 8 ft. (2.4 m)	2	3	3	4	6	4	4
027508SH	Stainless Steel End Cap	2	2	2	2	2	2	2
03090100	Tube and Reflector Hanger	2	3	3	4	5	4	4
91907302	S-Hook	2	3	3	4	5	4	4
03050010	Reflector Support Package (Strap, Wire, Form, Screws)	2	4	4	5	7	5	5
91107720	U-Clip Package	1	1	1	1	1	1	1
90502700	Vent Adapter	1	1	1	1	1	1	1
01318901	Tube Clamp Package	2	2	2	2	2	2	2
Extension Package Contents								
91409408	Tube, HT Aluminized - 10 ft. (3 m)	-	-	-	-	-	2	2
01312700	Stainless Steel Coupling Assembly	-	-	-	-	-	2	2
027508SS	Stainless Steel Reflector - 8 ft. (2.4 m)	-	-	-	-	-	3	3
03090100	Tube and Reflector Hanger	-	-	-	-	-	2	2
91907302	S-Hook	-	-	-	-	-	2	2
03050010	Reflector Support Package (Strap, Wire, Form, Screws)	-	-	-	-	-	3	3
91107720	U-Clip Package	-	-	-	-	-	1	1
Vent Cap Package Contents								
90502700	Vent Adapter	1	1	1	1	1	1	1
90502300	Vent Cap	2	2	2	2	2	2	2

▶Section 6. Assembly Overview

The figures in this section provide a general overview of component placement in a VANTAGE® HE system. The location of some components such as supports and couplings is crucial to proper installation. Assemble the heater components as shown in Figures 3 through 7.

Install appropriate suspension hardware, beam clamps, chain or rod at predetermined locations. Adjustment of chain length will provide uniform pitch (See Figure 15.)

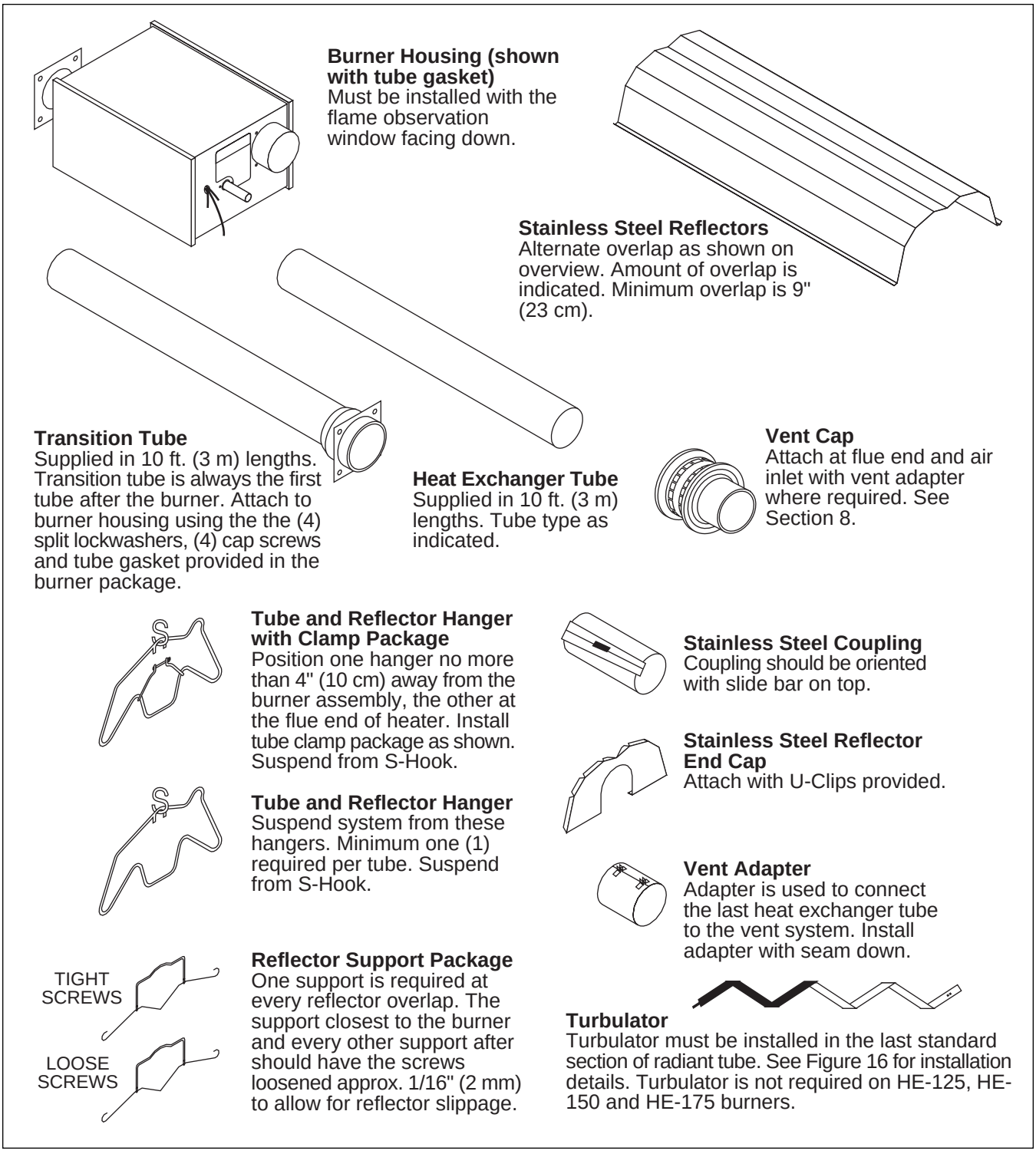

Burner Housing (shown with tube gasket)
Must be installed with the flame observation window facing down.
Stainless Steel Reflectors
Alternate overlap as shown on overview. Amount of overlap is indicated. Minimum overlap is 9" (23 cm).
Transition Tube
Supplied in 10 ft. (3 m) lengths. Transition tube is always the first tube after the burner. Attach to burner housing using the the (4) split lockwashers, (4) cap screws and tube gasket provided in the burner package.
Heat Exchanger Tube
Supplied in 10 ft. (3 m) lengths. Tube type as indicated.
Vent Cap
Attach at flue end and air inlet with vent adapter where required. See Section 8.
Tube and Reflector Hanger with Clamp Package
Position one hanger no more than 4" (10 cm) away from the burner assembly, the other at the flue end of heater. Install tube clamp package as shown. Suspend from S-Hook.
Tube and Reflector Hanger
Suspend system from these hangers. Minimum one (1) required per tube. Suspend from S-Hook.
TIGHT SCREWS
LOOSE SCREWS
Reflector Support Package
One support is required at every reflector overlap. The support closest to the burner and every other support after should have the screws loosened approx. 1/16" (2 mm) to allow for reflector slippage.
Stainless Steel Coupling
Coupling should be oriented with slide bar on top.
Stainless Steel Reflector End Cap
Attach with U-Clips provided.
Vent Adapter
Adapter is used to connect the last heat exchanger tube to the vent system. Install adapter with seam down.
Turbulator
Turbulator must be installed in the last standard section of radiant tube. See Figure 16 for installation details. Turbulator is not required on HE-125, HE-150 and HE-175 burners.

Figure 2. Assembly Overview

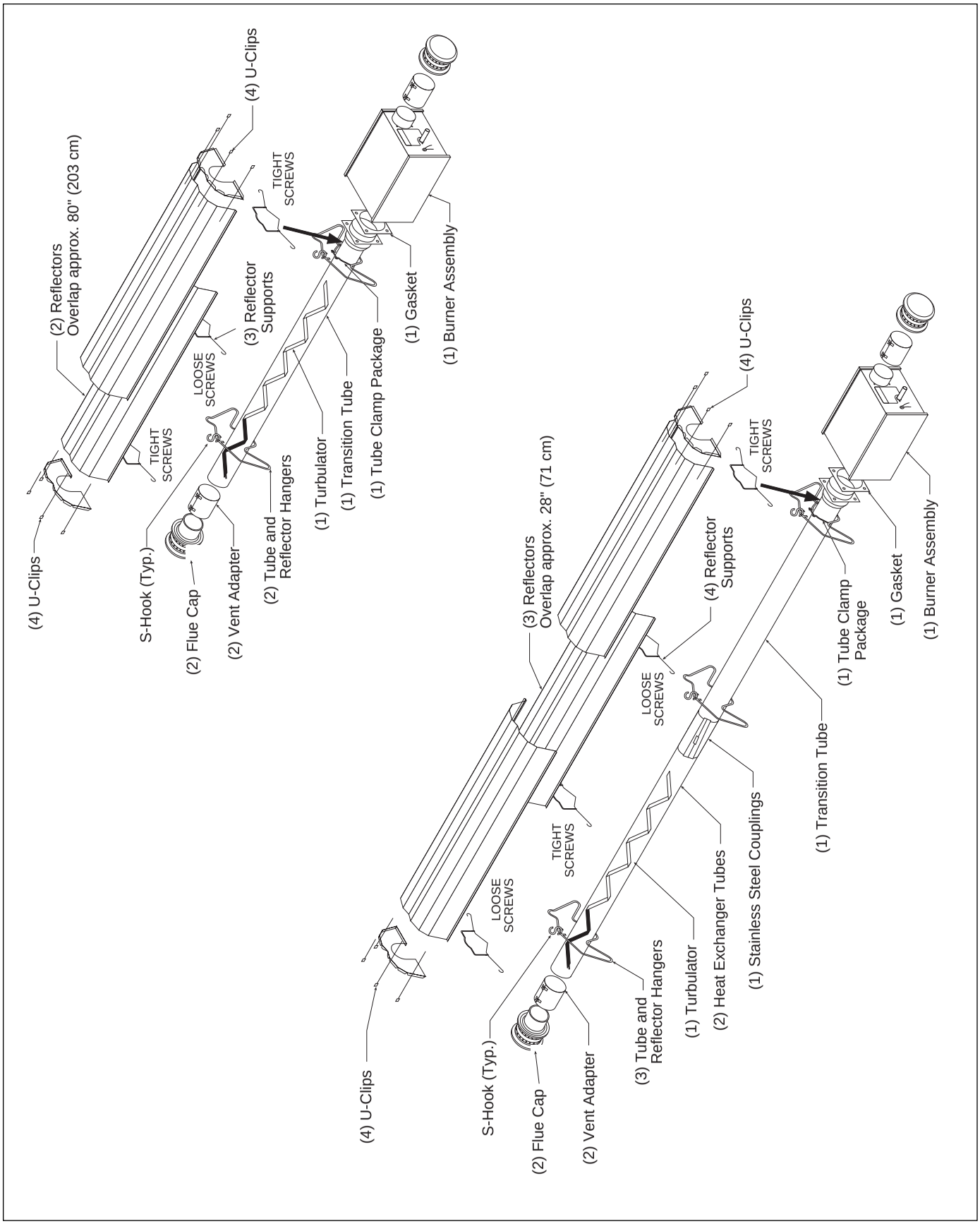


Figure 3. Assembly of 10 ft (3 m) Heat Exchanger System
Assembly of 20 ft (6 m) Heat Exchanger System

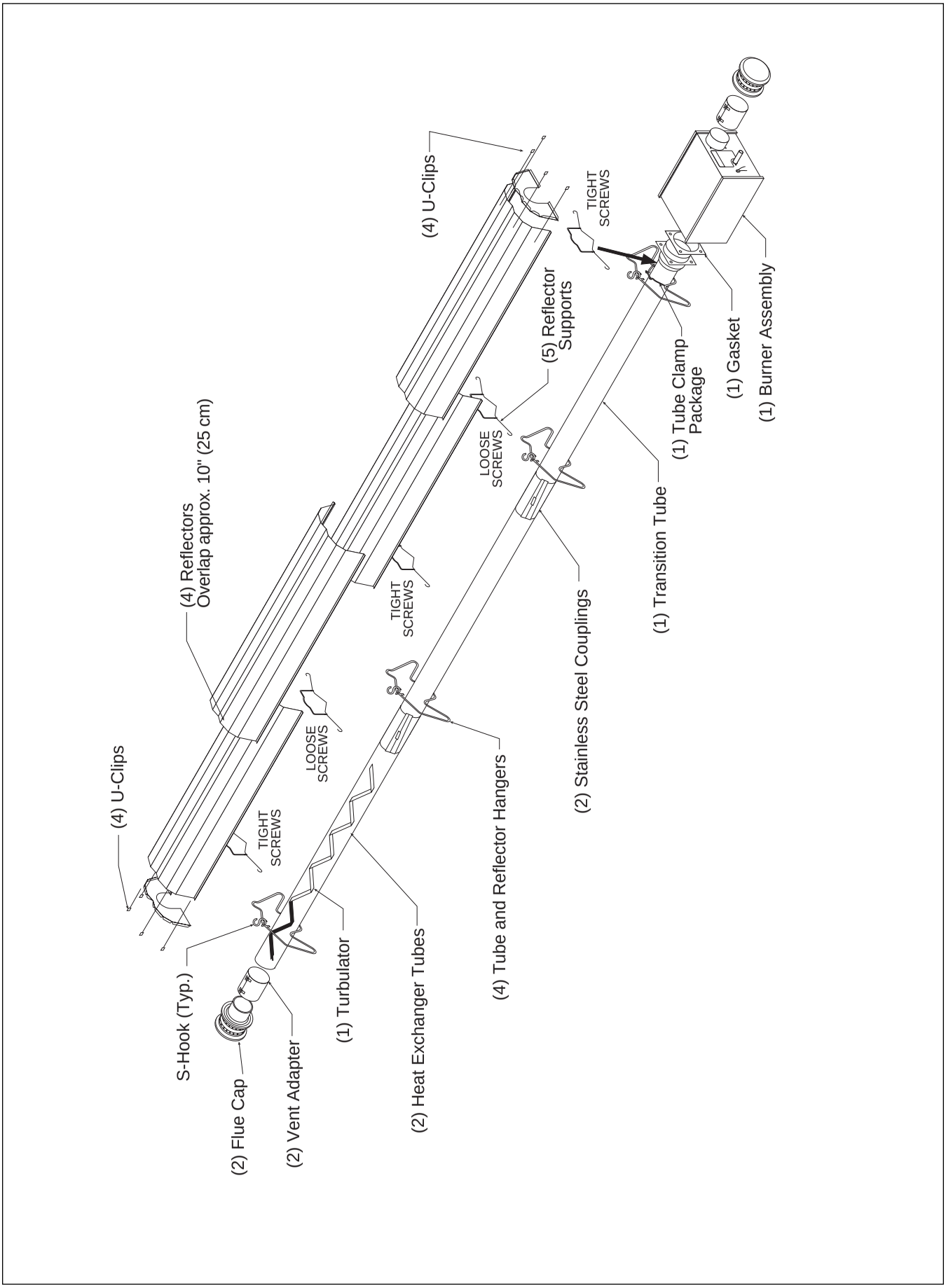


Figure 4. Assembly of 30 ft (9 m) Heat Exchanger System

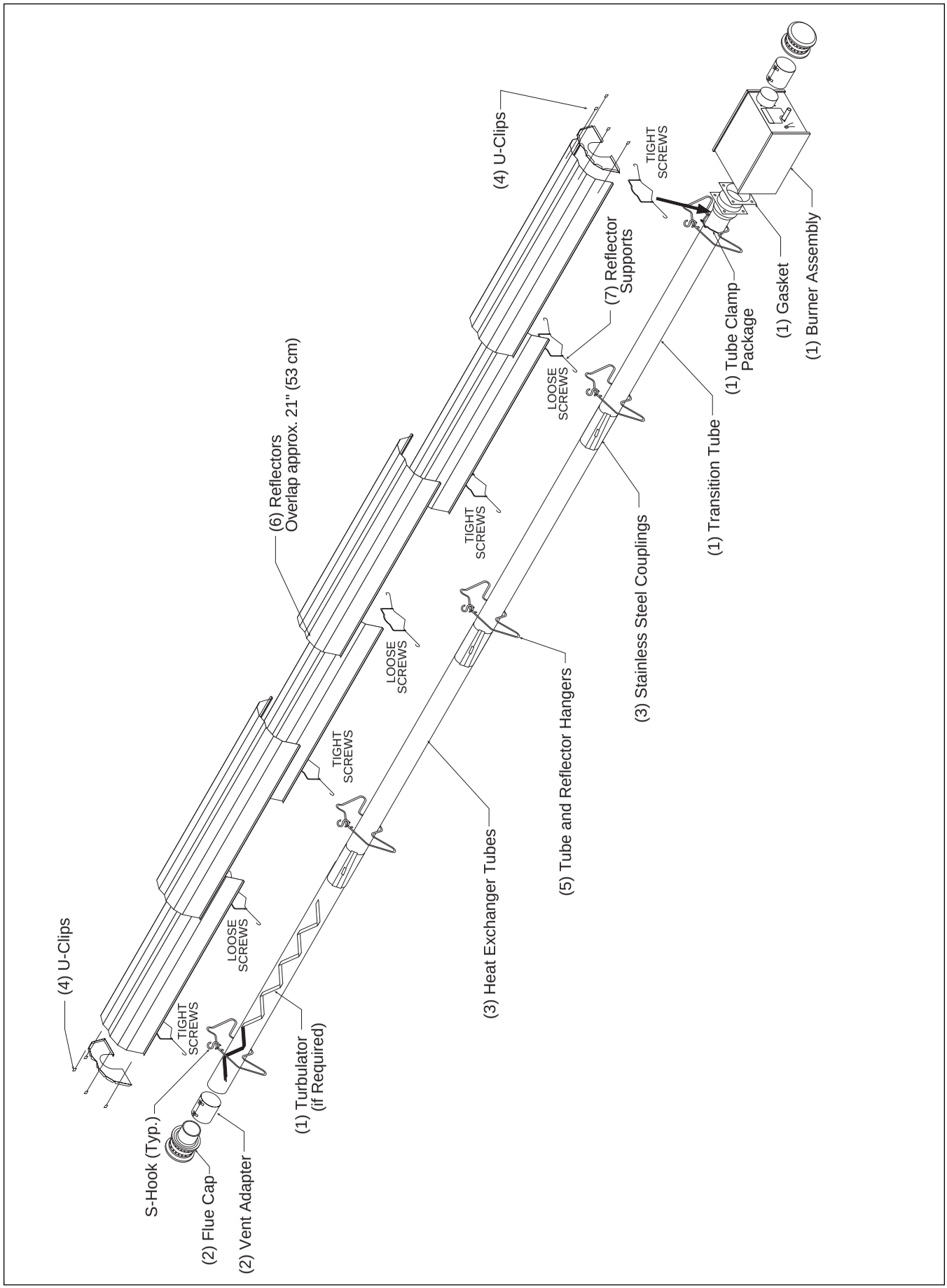


Figure 5. Assembly of 40 ft (12 m) Heat Exchanger System

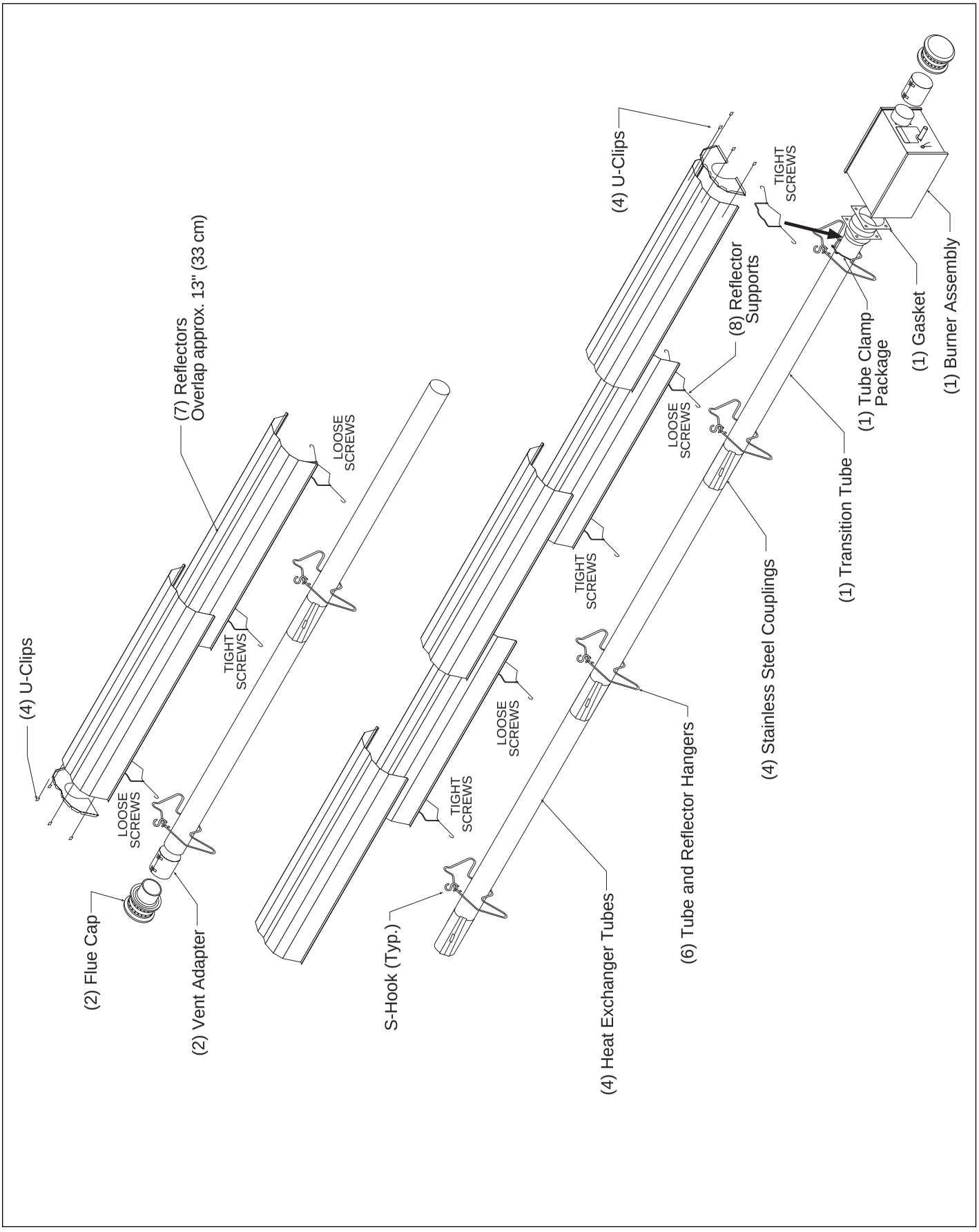


Figure 6. Assembly of 50 ft (15 m) Heat Exchanger System

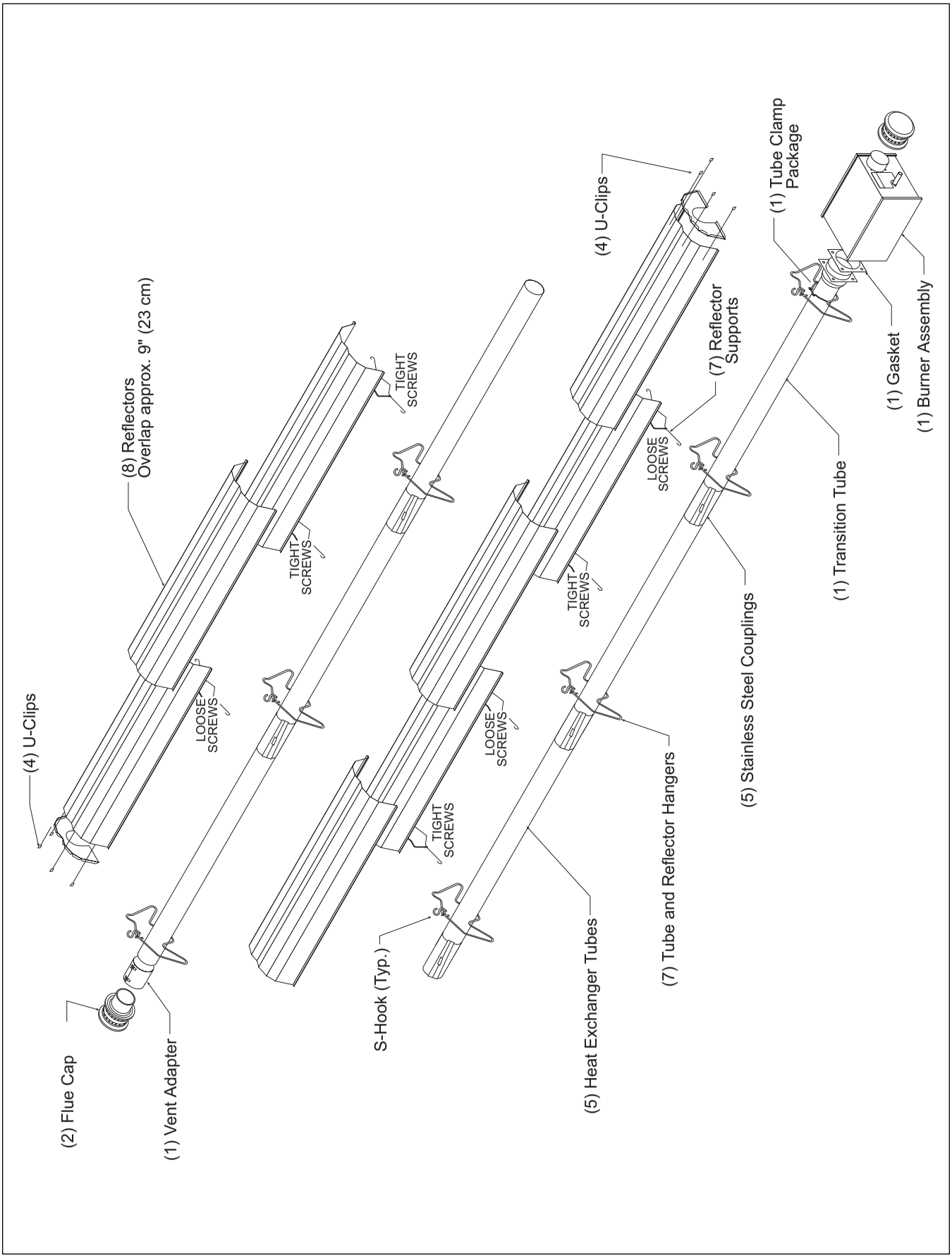


Figure 7. Assembly of 60 ft (18 m) Heat Exchanger System

▶Section 7. Component Installation

TUBE COUPLING INSTALLATION

Tube and tube fittings are connected by wrap-around couplings which clamp by means of a tapered, hammer-driven lock member.

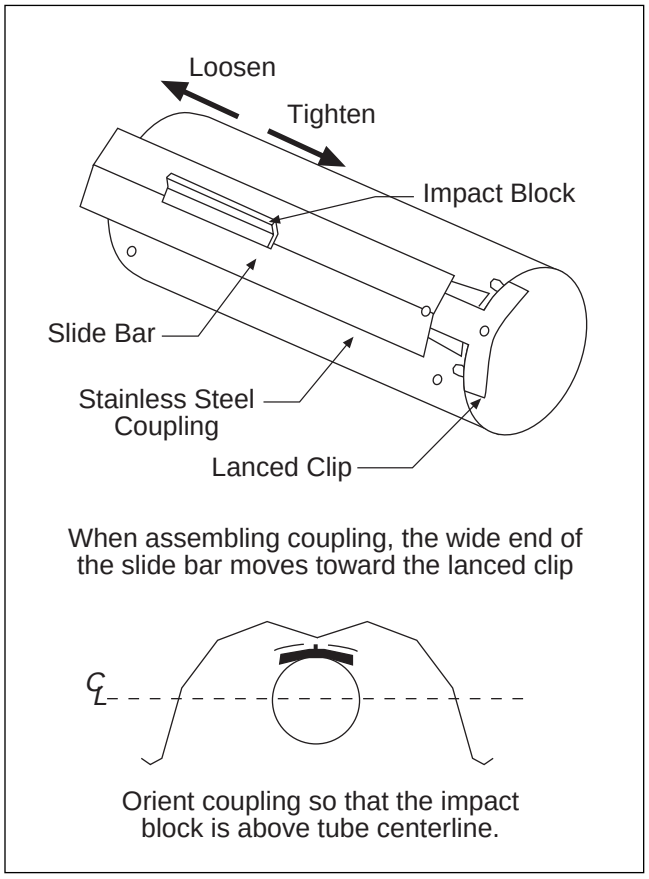

Loosen
Tighten
Impact Block
Slide Bar
Stainless Steel Coupling
Lanced Clip
When assembling coupling, the wide end of the slide bar moves toward the lanced clip
Orient coupling so that the impact block is above tube centerline.

Figure 8a. Coupling Assembly

To assemble the coupling, hook the free end of the coupling sleeve into the lanced clip. Place the wide end of the tapered slide bar on the coupling so that it moves toward the lanced clip. Insert the two tube ends into the coupling. Be sure the tube ends are in line and are flush against the stop pins inside the coupling.

Hammer-drive the slide bar until the coupling is secured snugly to the tubes. Overdriving the slide bar will distort the coupling or slide bar lip and will decrease the holding capability of the coupling. Coupling should be tight when the slide bar is ± 2" (5 cm) from the end of the coupling. See Figure 7a.

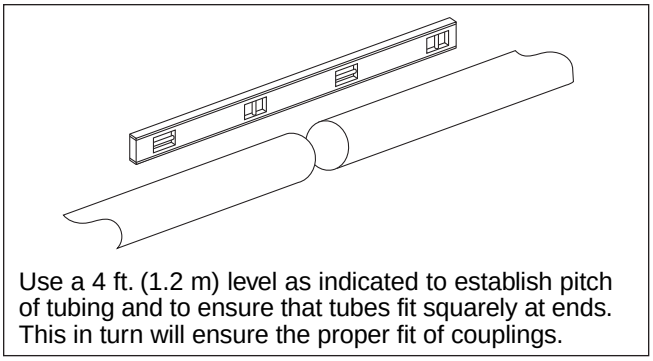

Use a 4 ft. (1.2 m) level as indicated to establish pitch of tubing and to ensure that tubes fit squarely at ends. This in turn will ensure the proper fit of couplings.

Figure 8b. Level Tubing

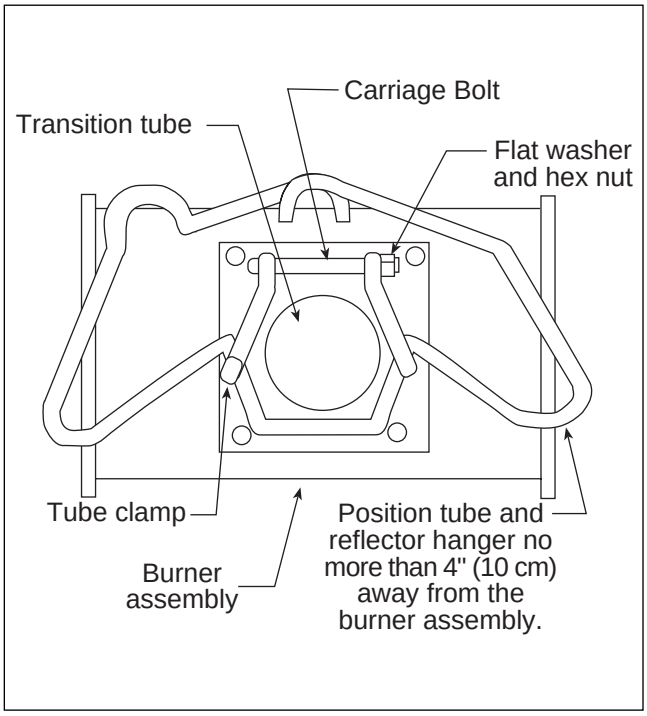

Carriage Bolt
Transition tube
Flat washer and hex nut
Tube clamp
Burner assembly
Position tube and reflector hanger no more than 4" (10 cm) away from the burner assembly.

Figure 9. Tube Clamp Package

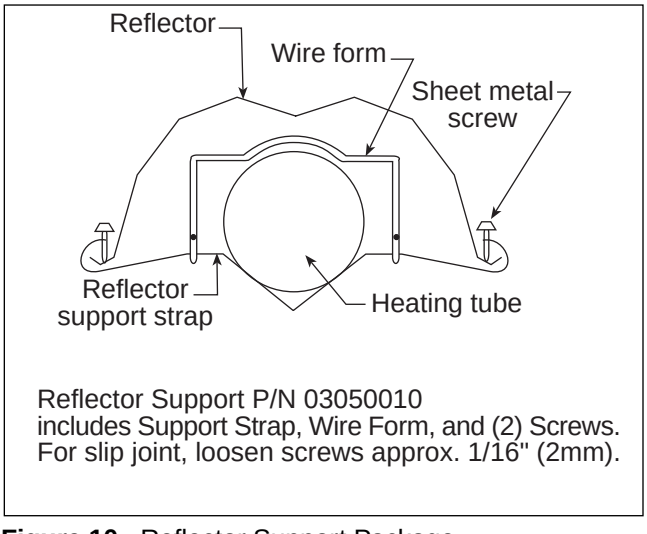


Figure 10. Reflector Support Package

ELBOW INSTALLATION

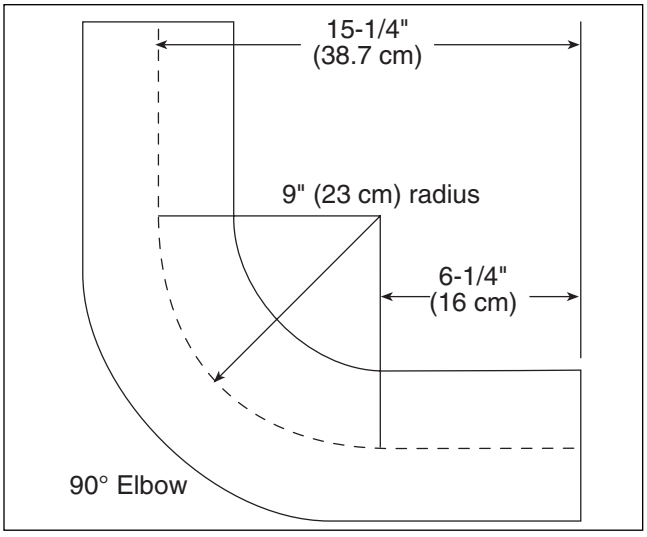


Figure 11. 90° Elbow Fitting Dimensions

ELBOW FITTING

VANTAGE® HE heaters may be installed using an optional 90° Elbow fitting (P/N 01335801) along with one additional Stainless Steel End Cap (P/N 027508SH) and one additional Stainless Steel Coupling Assembly (01312700).

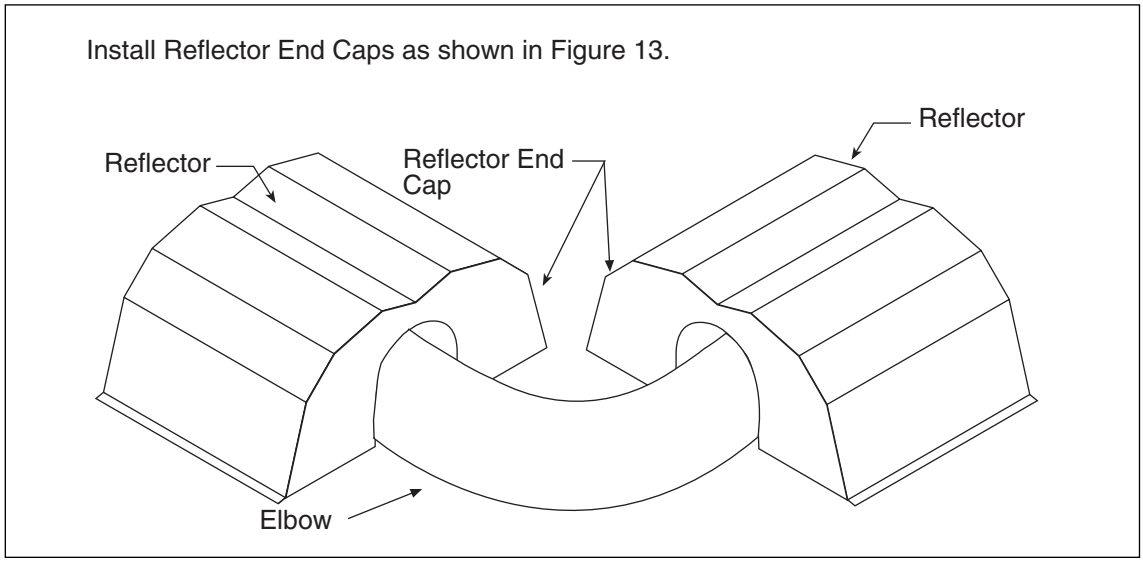


Figure 12. Elbow Installation

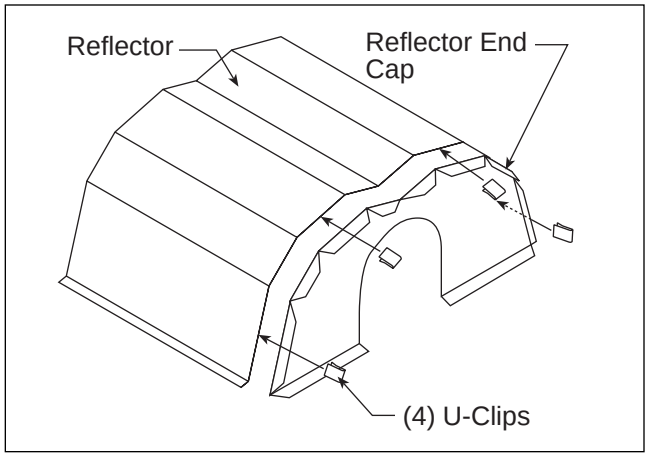


Figure 13. Reflector End Cap Installation

REFLECTOR END CAP INSTALLATION

Reflector end caps must be installed over the open ends of reflectors. Attach the end cap to the reflector using a minimum of four U-clips per end cap (see Figure 13).

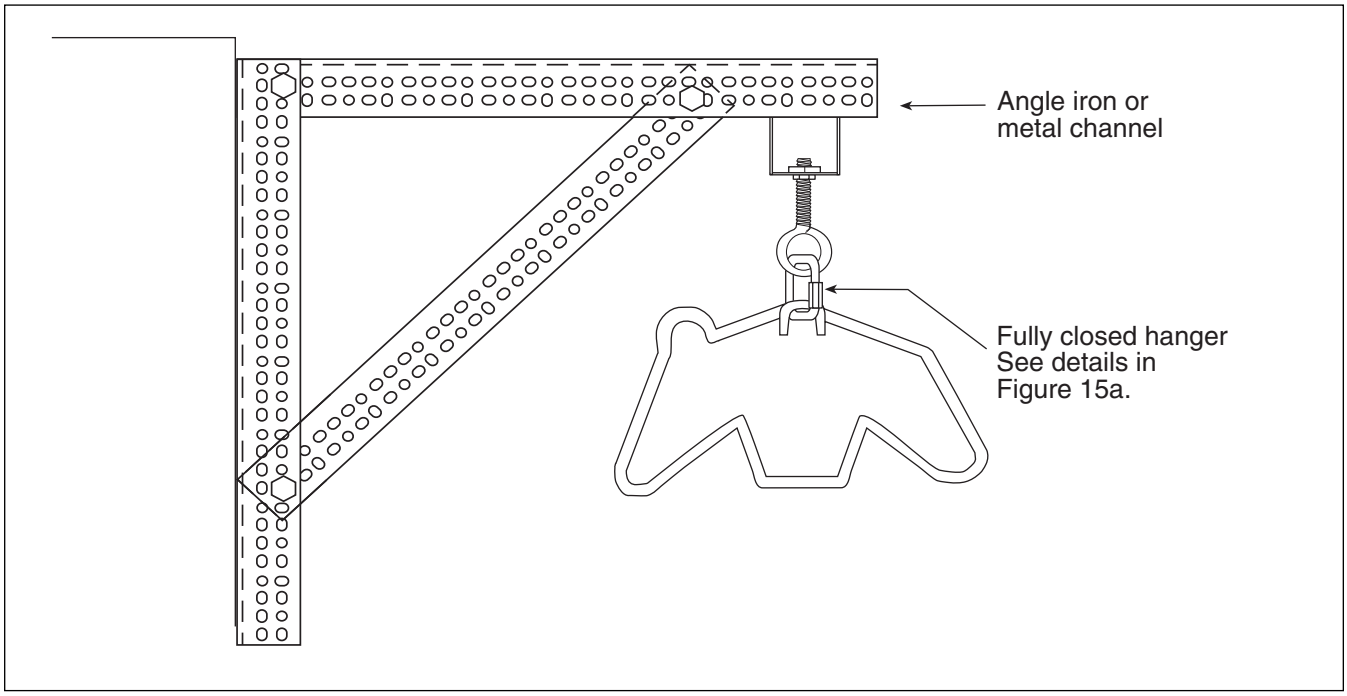


Figure 14. Typical Outdoor Installation

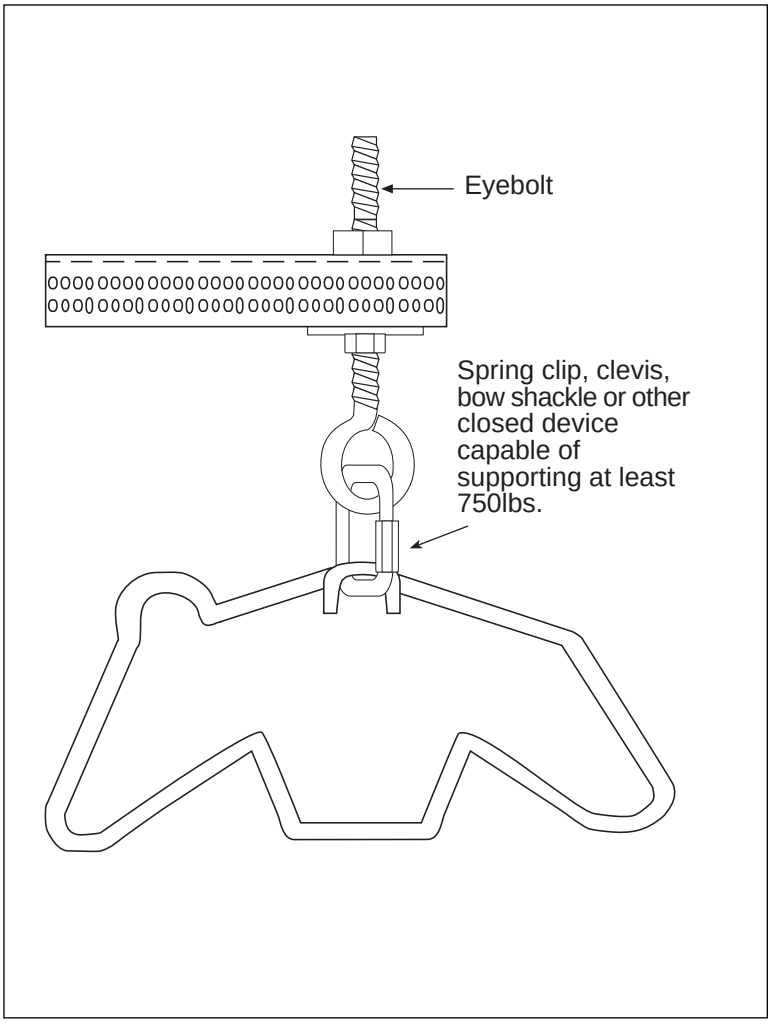


Figure 15a. Outdoor Hanging Details

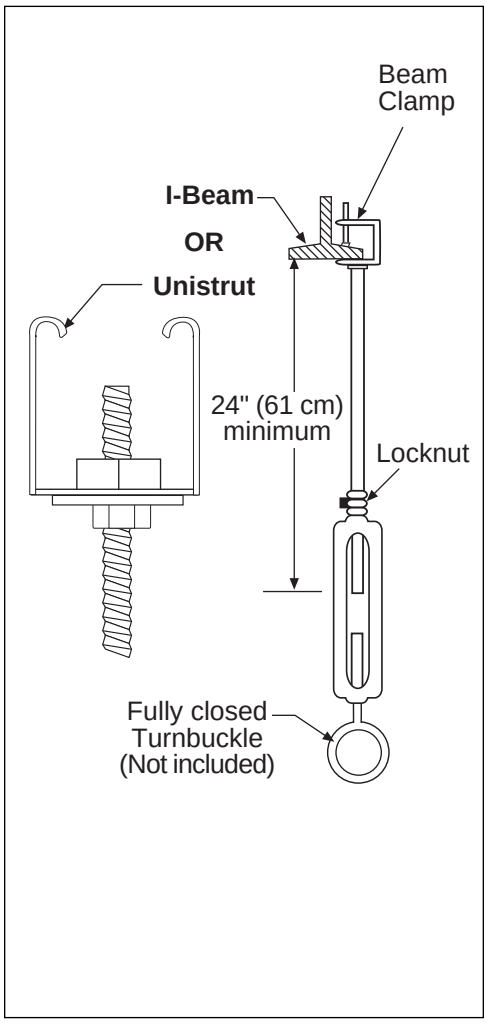


Figure 15b. Outdoor Installation

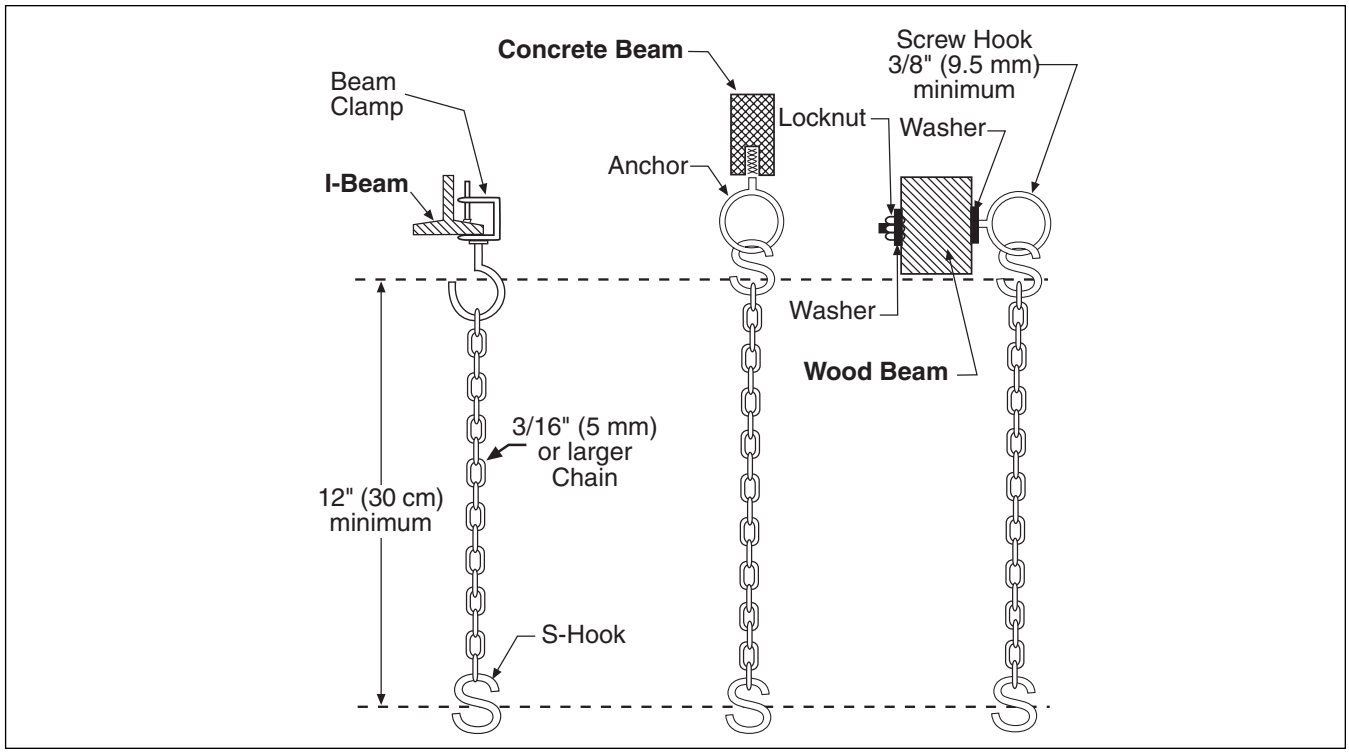


Figure 16. Typical Suspension Details for Indoor Installation Only

TURBULATOR INSTALLATION

For ease of installation, the turbulator should be installed in the tube before hanging the system. Use the following procedure (see Figure 17):

1. Assemble turbulator pieces by “twisting” matching ends together.
2. Insert a long wire (11 ft. (3.3 m) minimum) down the length of the tube. Attach the wire to the hole in the tab on the adapter piece.
3. Using the wire, pull the assembled turbulator into the tube from the opposite end. Pull the turbulator through until just the tab comes out. Detach the wire.
4. Bend the tab around the tube. When installed, the vent adapter will lock the tab in place.

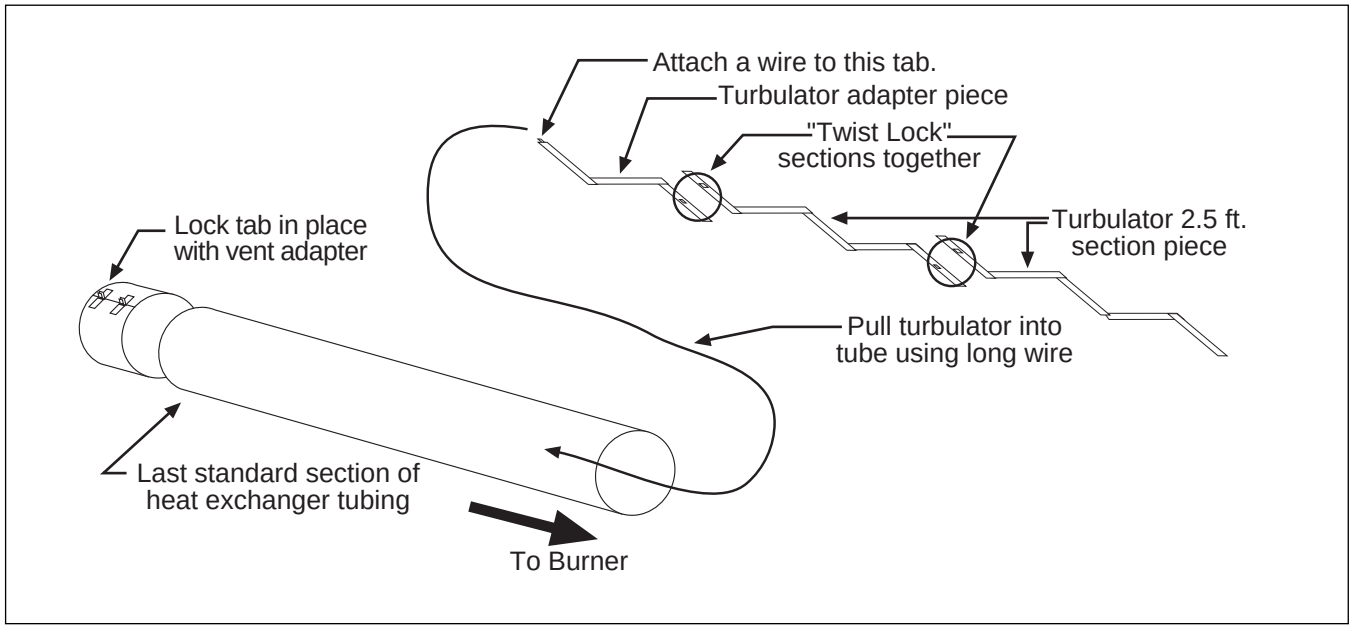
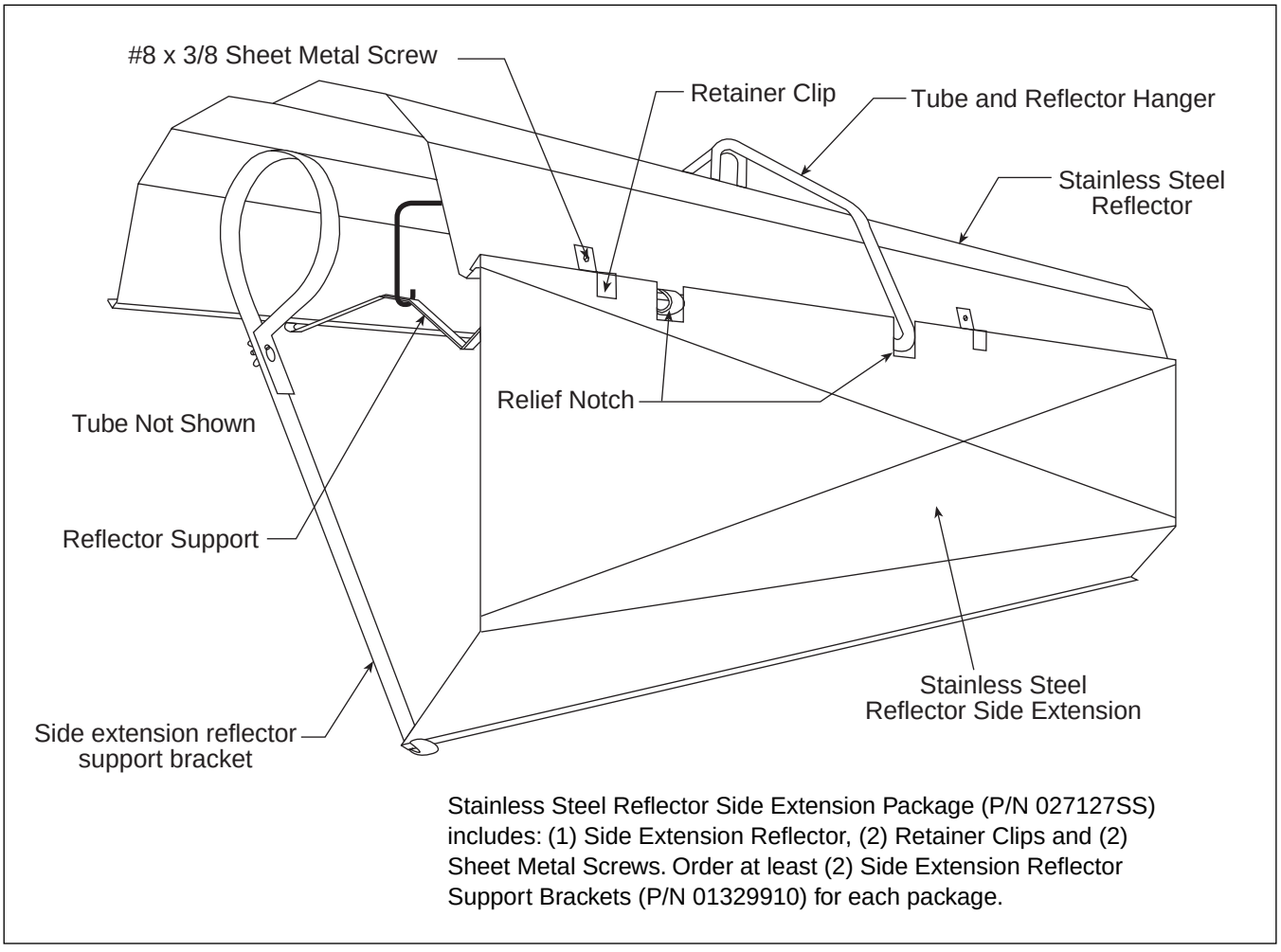


Figure 17. Turbulator Baffle Assembly Detail

SIDE EXTENSION REFLECTOR (Not for Outdoor Use)

Optional Side Extension Reflectors may be installed on either side of the unit. Each 8 ft. (2.4 m) section of Side Reflector should match a reflector and have identical overlap to adjacent reflectors. Provide slip joints in the same locations as the reflectors. Proceed as follows (see Figure 18):

1. Attach a reflector side extension support bracket to the tubes where needed. These brackets should be located adjacent to the overlapped joints of the reflectors.
2. Insert lower edge of reflector side extension in extension support bracket.
3. Cut suitable relief notches where the side extension reflector meets tube and reflector hangers and reflector support brackets.
4. Hook the top edge of the side extension reflector over the edge of the reflector.
5. A slip joint must be provided in the perimeter side extension at the location of each slip joint in the reflector. The overlap should be the same as the reflector.
6. Where severe air movement may be encountered, as at a large door, one or two sheet metal screws should be used to attach the side extension reflectors together. Additional reflector supports are also recommended.
7. To Install the Retainer Clips: Lay bracket over the side extension reflector and standard reflector at the selected location. By using the hole in the clip as a template, drill or punch a 3/32" (2.4 cm) diameter pilot hole in the standard reflector. Secure the retainer clip using #8 x 3/8" sheet metal screws.



Stainless Steel Reflector Side Extension Package (P/N 027127SS) includes: (1) Side Extension Reflector, (2) Retainer Clips and (2) Sheet Metal Screws. Order at least (2) Side Extension Reflector Support Brackets (P/N 01329910) for each package.

Figure 18. Installation of Side Extension Reflectors for Indoor Installations

U-TUBE PACKAGE

VANTAGE® HE heaters (except HE-40) are approved for optional U-Tube configurations. The U-Tube Package (P/N 030110SS) includes: (1) 180° U-Tube, (1) Stainless Steel Coupling, (1) Tube and Reflector Hanger, (2) Stainless Steel End Caps, (1) U-Tube Support Bracket, (2) 4" (10 cm) U-Bolts with Lockwashers and Hex Nuts and (2) Tube Clamp Packages.

Shown below is an example of an HE-100 U-Tube configuration. One of the 10 ft. (3 m) tubes was cut in half to balance the sides. (The layout does not need to be symmetrical.) One (1) additional coupling was needed to complete the installation. The U-Tube may be installed in either a standard horizontal position or in an opposite 45° position as shown below. When designing a U-Tube configuration, the following rules must be adhered to:

1. A minimum of 10 ft. (3 m) on HE-60/80 and a minimum of 15 ft. (4.6 m) on HE-100/125/150/175 is required between the burner and the U-Tube.
2. The correct turbulator must be installed in the last standard section of heater tube.
3. The burner must never be operated in a tilted position.
4. The heater must be properly supported at all locations.

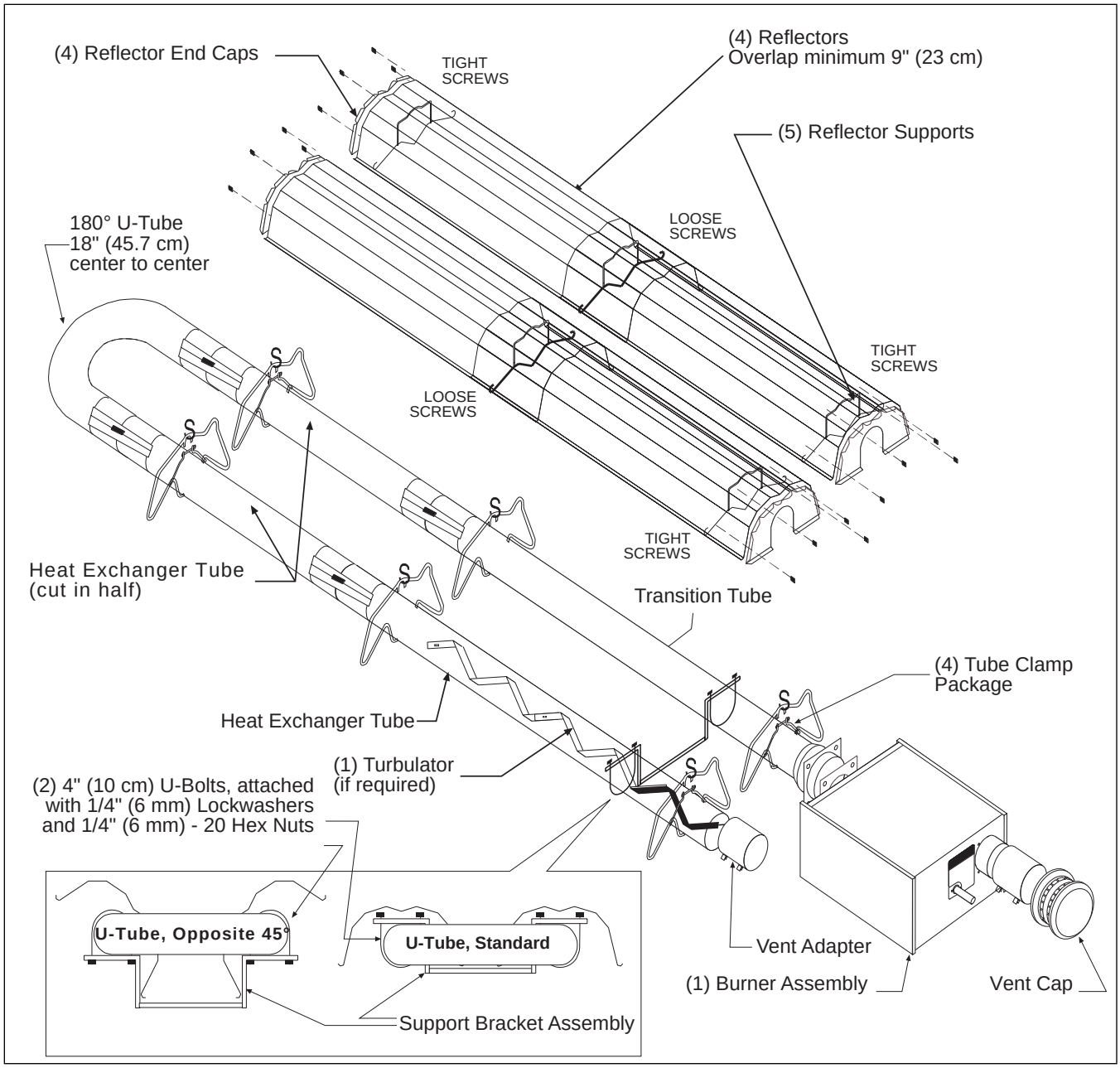


Figure 19. U-Tube Package Assembly Overview (optional)

▶Section 8. Venting and Ducting

⚠ WARNING

Carbon Monoxide Hazard

Heaters installed unvented must be interlocked with sufficient building exhaust.

Heaters must be installed according to the installation manual.

Failure to follow these instructions can result in death or injury.

Heater must be vented in accordance with the proper national and local codes. Partial information relating to these specifications is provided in this section with regard to size and configurations for venting arrangements. **United States**: Refer to NFPA-54/ANSI-Z223.1 - latest revision, National Fuel Gas Code. **Canada**: refer to CAN/CGA-B149.1 and B149.2

Heater may be vented one of the following ways:

Unvented (with adequate ventilation)	pg. 24
Horizontal Venting - Combustible walls	pg. 24
Horizontal Venting - Noncombustible walls	pg. 24
Common Side Wall Venting	pg. 25
Vertical Venting without Draft Hood	pg. 26
Common Vertical Venting	pg. 27
Outside Combustion Air - Single Heater	pg. 28
Outside Combustion Air - Two Heaters	pg. 29

The method chosen will depend upon a number of factors including: building ventilation, available access points in walls and ceiling, number of burners installed, installation codes, etc. Consult layout drawing for venting method used. Some installations may require the use of an outside combustion air supply. (See page 28 for details).

General Venting Requirements

Use the following guidelines to help insure an adequate, safe venting arrangement: (See Figure 21.)

a) Exhaust end of heater will accept a 4" (10 cm) vent pipe using the vent adapter (P/N 90502700). Install the vent adapter with the seam down. This will prevent condensation from leaking out of the adapter.

b) Vent terminal opening must be beyond any combustible overhang.

c) If condensation in the vent is a problem, the vent length should be shortened or insulated.

d) For outside air installations, the outside air terminal must not be installed more than 1 ft. (30 cm) above the vent terminal.

e) Secure all joints with minimum (3) #8 x 3/8" sheet metal screws.

f) All vent joints should be sealed using suitable product such as General Electric RTV106 or Permatex Form-a-Gasket red high temperature silicone adhesive sealant.

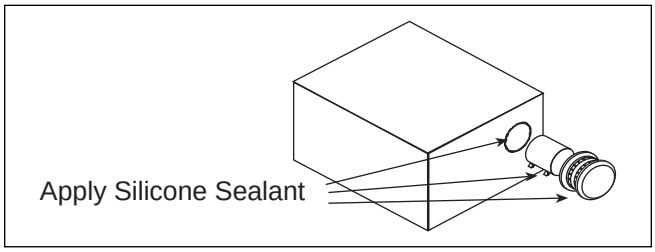


Figure 20a. Vent Cap for Outdoors

g) For Outdoor Installations, vent caps must be installed at inlet and flue end. (See Figure 21.).

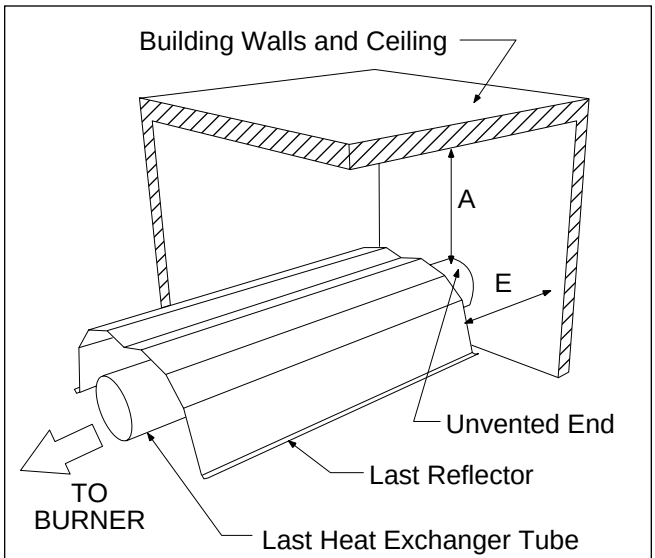
Vent Length Requirements (Indoor)

a) Maximum vent length allowed is 45 ft. (13.7 m).

b) Maximum outside air supply duct allowed is 45 ft. (13.7 m).

c) Vent length plus outside air supply length shall not exceed 65 ft. (19.8 m).

d) Under length conditions a) through c) above, a total of 2 elbows are allowed for vent and outside air supply together. Subtract 15 ft. (4.6 m) per additional elbow from maximum length allowed if more than 2 elbows are used.



A & E are clearances to combustibles. See Figure 1h in Section 4.

Figure 20b. Unvented Operation (Indoor)

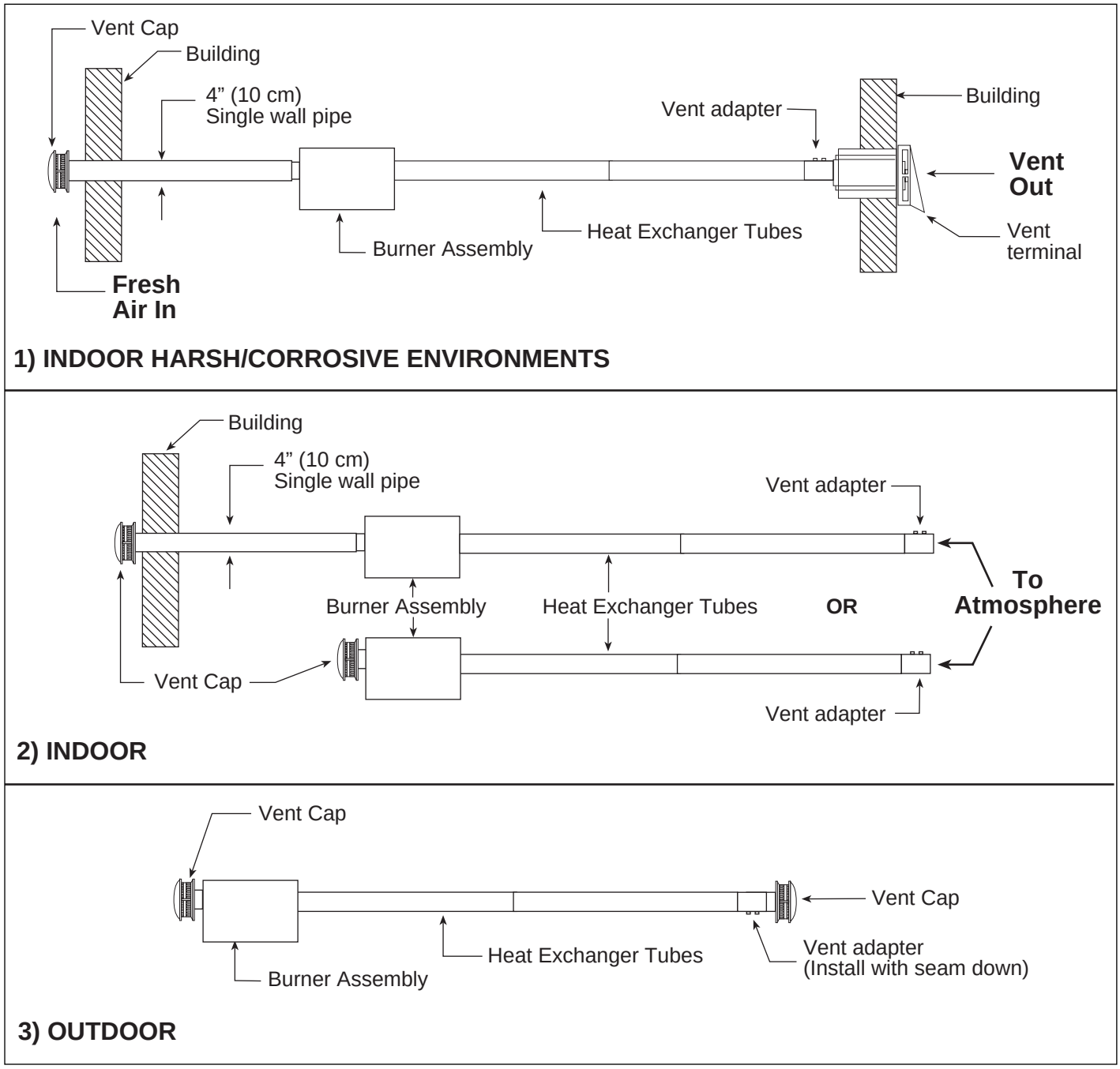


Figure 21. Venting Options

UNVENTED OPERATION (INDOOR) (See Figure 20b.)

a) Sufficient ventilation must be provided in the amount of 4 cfm per 1000 BTU/hr firing rate **(United States)**; 3 cfm per 1000 BTU/hr firing rate **(Canada)**.

b) If exhaust fans are used to supply ventilation air, an interlock switch must be used to prevent the heater from coming on when the fans are off. This may be done using an air pressure switch.

c) For additional information: **United States**: Refer to National Electrical Code, ANSI/NFPA-70 - latest revision. **Canada:** Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances.

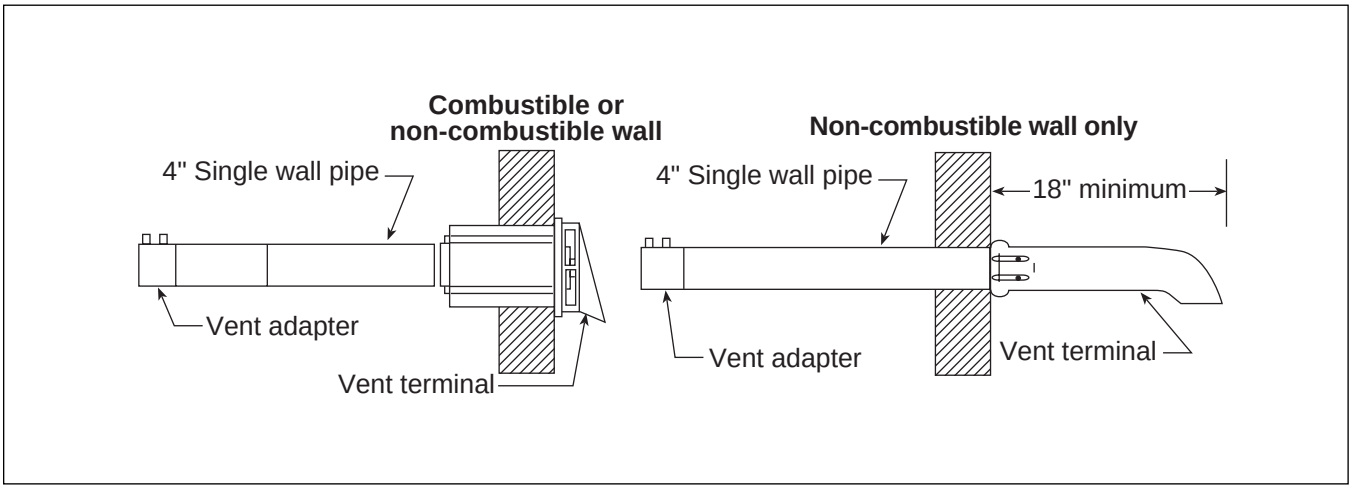


Figure 22. Horizontal Venting Configurations

HORIZONTAL VENTING (See Figure 21)

a) In combustible or noncombustible walls, use insulated vent terminal (P/N 90502100, Tjernlund VH1-4 or equivalent). Follow vent manufacturer's instructions for proper installation.

b) For noncombustible walls only, use vent terminal (P/N 02537801).

c) 4" (10 cm) O.D. vent pipe is required, 30 ft. (9 m) maximum length is recommended. Up to 45 ft. (13.7 m) maximum may be used if insulated to prevent excess condensation.

d) Vent terminal should be installed at a height sufficient to prevent blockage by snow. Building materials should be protected from degradation by vent gases.

e) Insure the vent pipe has a downward pitch of 1/2" per 20 ft. (1.3 cm per 6 m) away from the burner.

Requirements (United States)

a) Vent must exit building not less than 7 ft. (2 m) above grade when located adjacent to public walkways.

b) Vent must terminate at least 3 ft. (1 m) above any forced air inlet located within 10 ft. (3 m).

c) Vent must terminate at least 4 ft. (1.2 m) below, 4 ft. (1.2 m) horizontally from, or 1 ft. (30 cm) above any door, window, or gravity inlet into any building.

d) Vent terminal shall be located at least 1 ft. (30 cm) from any opening through which vent gases could enter a building.

Requirements (Canada)

a) Vent terminal must not be installed less than 3 ft. (1 m) from any building opening.

b) Vent must be at least 6 ft. (1.8 m) from the combustion air opening of this unit or any other appliance.

c) Vent terminal must be installed at least 3 ft. (1 m) above grade.

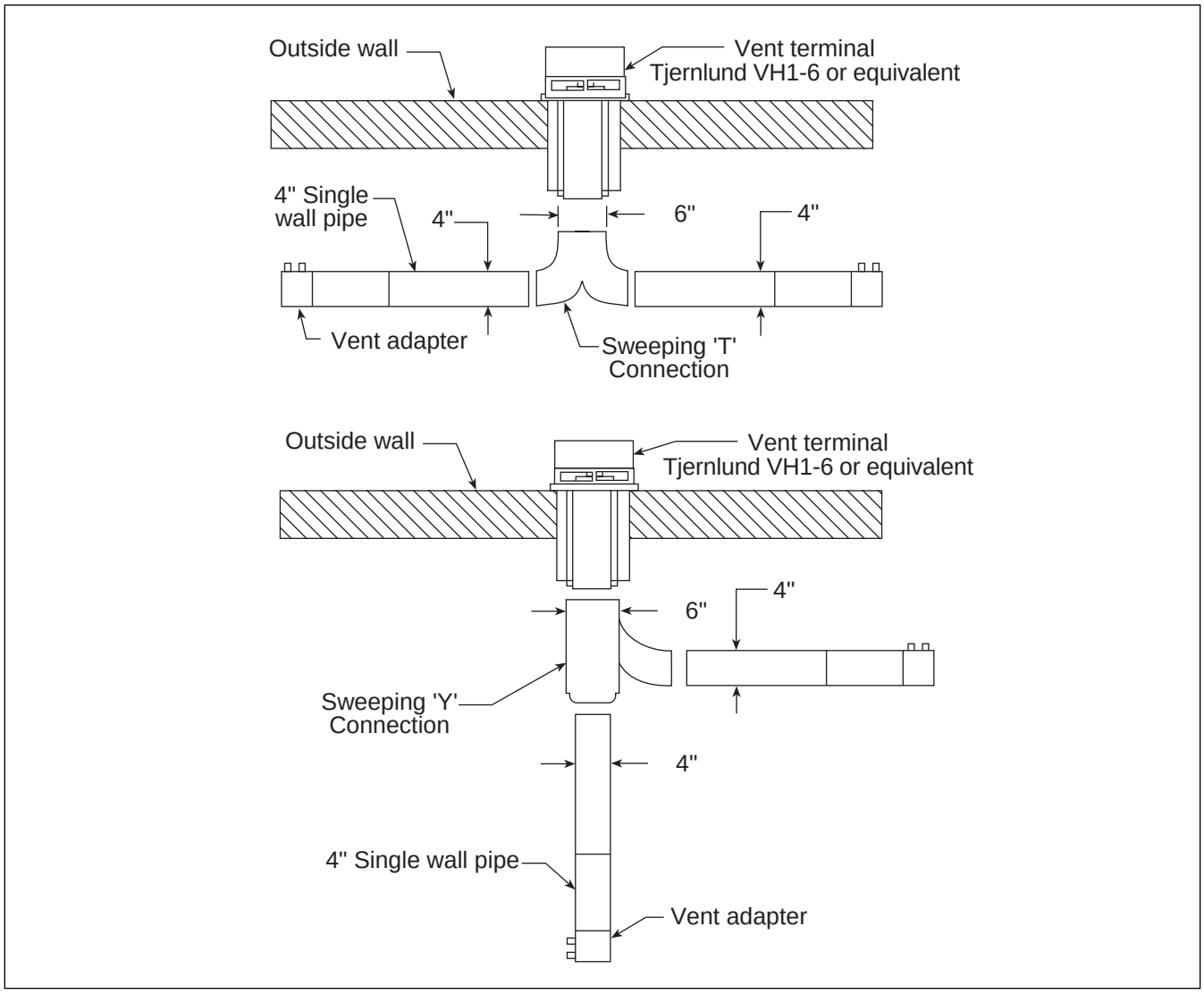


Figure 23. Common Side Wall Venting Configurations

COMMON SIDE WALL VENTING (See Figure 23)

Requirements

a) Maximum of two units may be vented together into a 6" (15 cm) diameter common vent.

b) Units must be of the same BTU input.

c) Units must be controlled from one common thermostat.

d) Use a sweeping tee, or sweeping Y connection. These connections may be purchased from any sheet metal fitting manufacturer.

Recommendations

Although not compulsory, an outside air supply to the burners is recommended.

VERTICAL VENTING (See Figure 24)

a) In the **United States**: Refer to NFPA-54/ANSI-Z223.1 - latest revision, National Fuel Gas Code, for proper vent sizes and installation.

b) In **Canada:** Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances, for proper vent sizes and installation.

c) Type "B" vent materials must be used outdoors.

d) An insulating thimble may be required to pass through combustible structures.

e) 4" (10 cm) O.D. vent pipe, maximum 45 ft. (13.7 m) in length may be used as shown above with an approved vent cap.

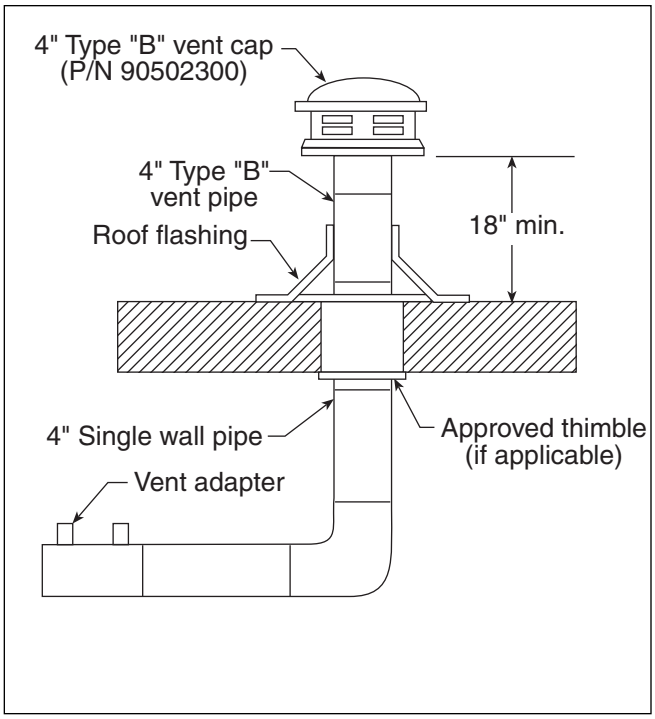


Figure 24. Vertical Venting Configuration

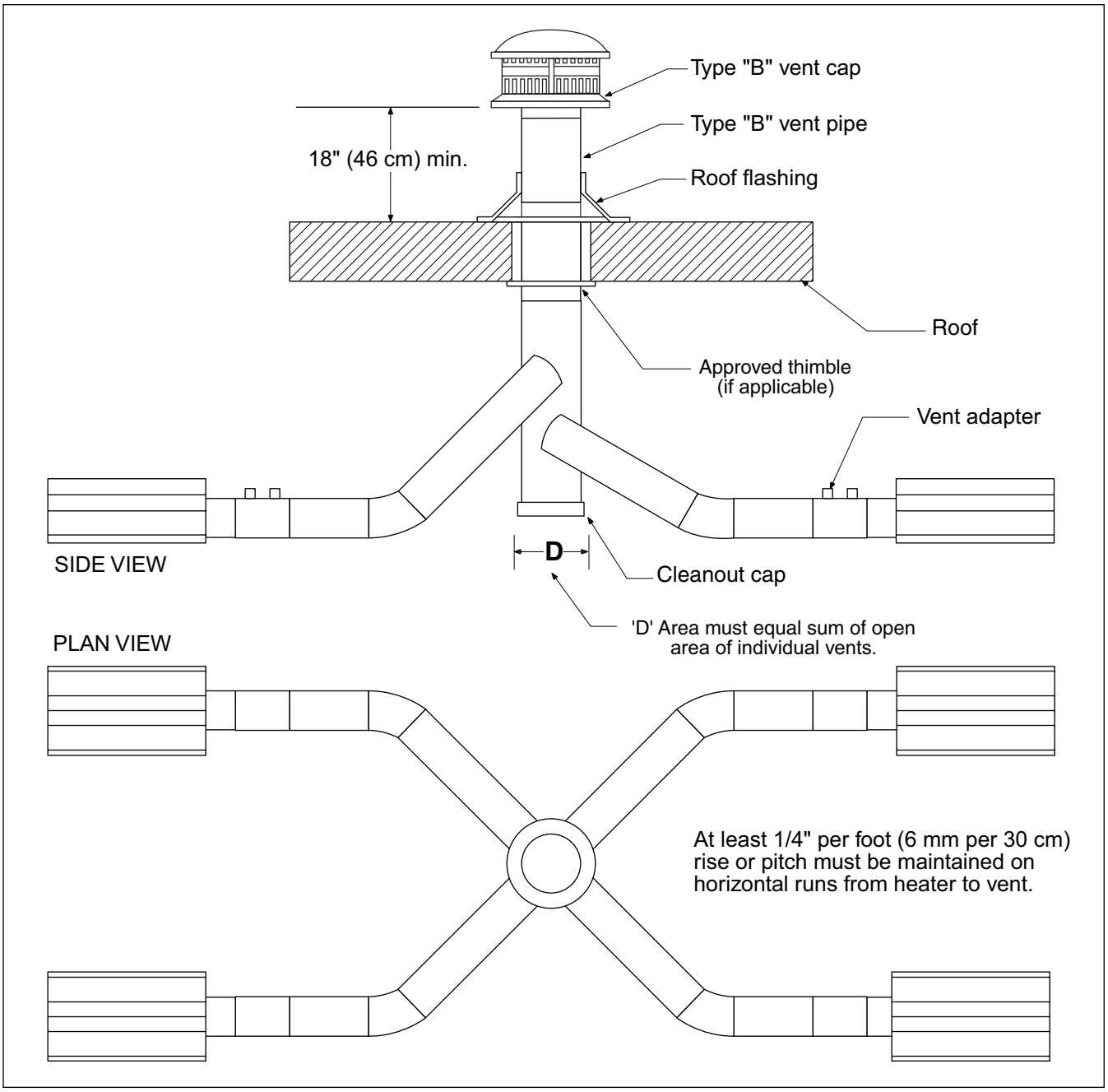


Figure 25. Common Vertical Venting

Common Vertical Venting (See Figure 25)

a) Open area of common vent must equal the sum of the open area of individual vents connected to it.

b) Heaters sharing a common vent must be controlled by the same thermostat.

c) Connections to common stack must be positioned to avoid direct opposition between streams of combustion gases.

d) Maximum horizontal length of vent to common vent 15 ft. (4.6 m). Maximum vertical vent 15 ft. (4.6 m).

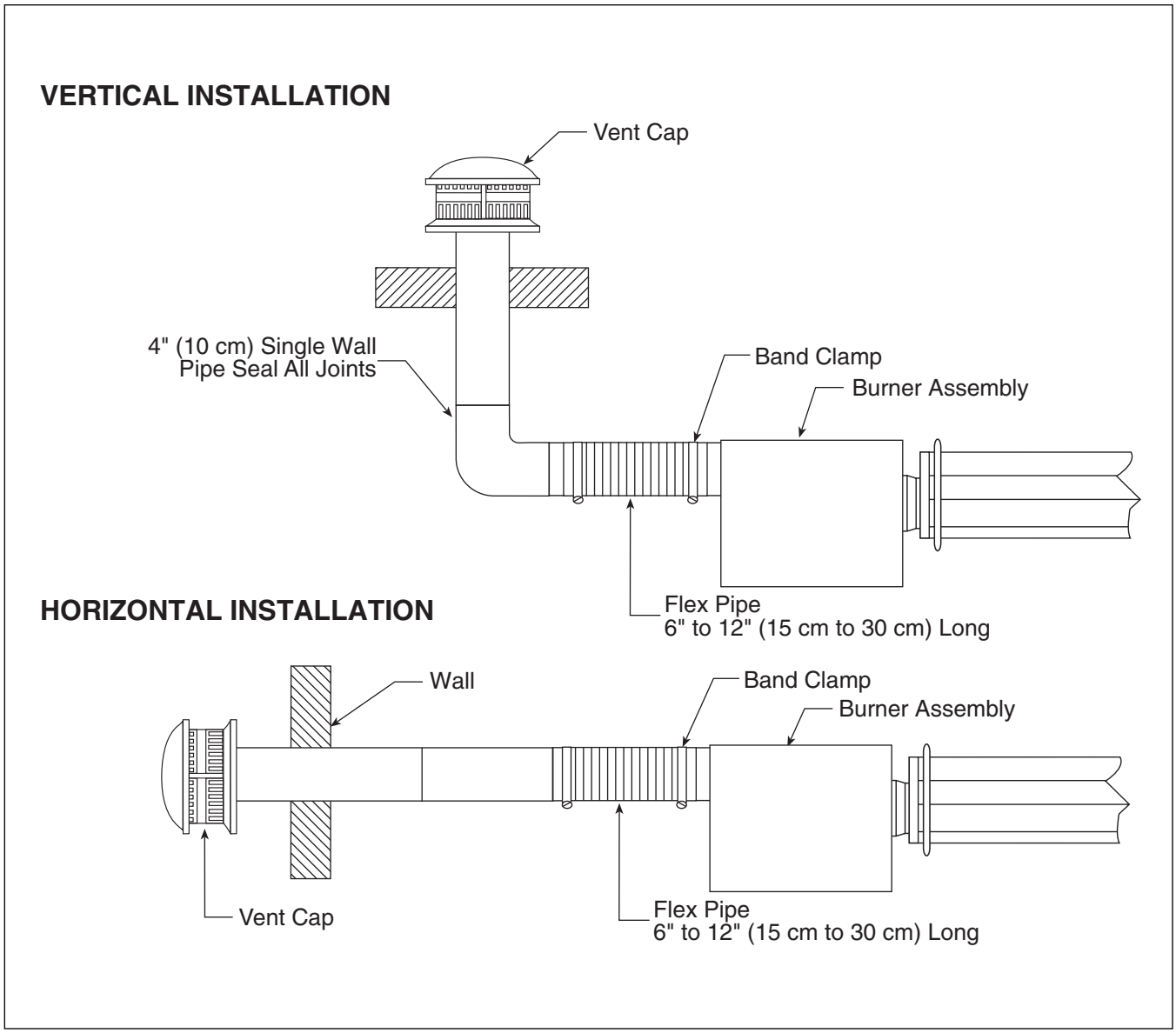


Figure 26. Non-Pressurized Outside Air Supply for Single Heater Installations

OUTSIDE COMBUSTION AIR SUPPLY

IMPORTANT: If the building has a slight negative pressure or contaminants such as halogenated hydrocarbons are present in the air, an outside combustion air supply to the heaters is strongly recommended.

The VANTAGE® HE heater is approved for installation with an outside air supply system. An outside air supply should not be used with the draft hood venting configuration.

For an outside air supply, a 4" (10 cm) O.D. single wall pipe may be attached to the heater. The duct may be up to 45 ft. (13.7 m) maximum length or 2 ft. (60 cm) minimum length with no more than 2 elbows. See Vent Length Requirements heading on pg. 22 for more detailed guidelines.

The air supply duct may have to be insulated to prevent condensation on the outer surface. The outside air terminal should be securely fastened to the outside wall by drilling four 1/4" (6 mm) diameter holes in the outside flange; wood screws or bolts and expansion sleeves may be used to fasten the terminal.

For the outside air terminal, use the Vent Cap (P/N 90502300) that is provided with the VANTAGE® HE heater.

PVC pipe, aluminum flex duct, or equivalent may be used instead of single wall pipe for the outside combustion air supply.

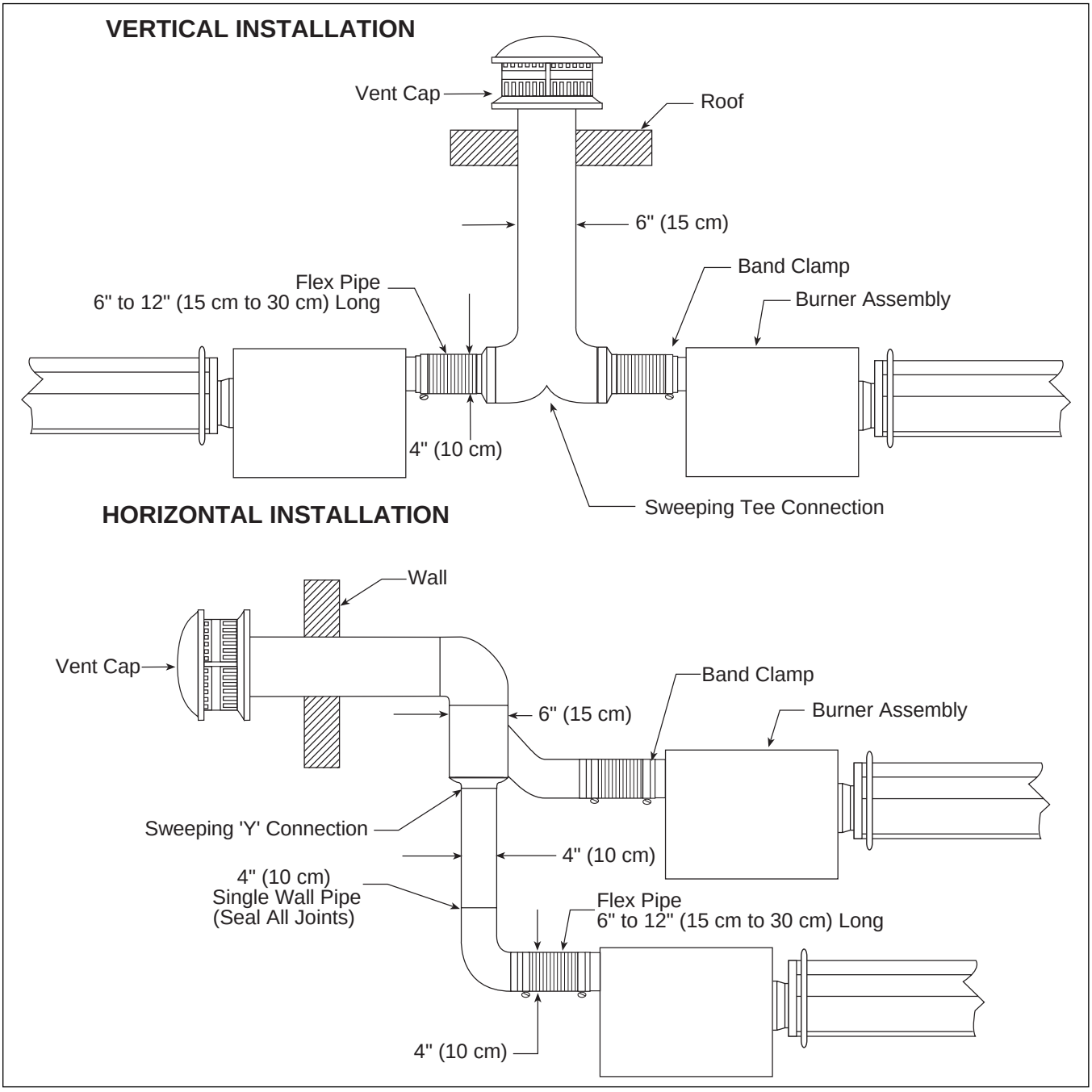


Figure 27. Non-Pressurized Outside Air Supply for a Maximum of Two Heaters Controlled by a Common Thermostat

OUTSIDE COMBUSTION AIR SUPPLY (CONTINUED)

When air is supplied for combustion to a maximum of two heaters through a common duct, the following rules apply:

1. Follow the venting rules on page 22 for detailed guidelines.
2. The two units must be controlled by a common thermostat.
3. Use 4" O.D. (10 cm O.D.) single wall or PVC pipe between the heater connection and the common source. The common source will be a minimum of 6" O.D. (15 cm O.D.) single wall or PVC pipe.
4. Combined length of the 4" (10 cm) and 6" (15 cm) pipe shall not exceed 45 ft. (13.7 m) with 2 elbows maximum per unit (see Fig. 28). See also Vent Length Requirements heading on page 22 for more detailed guidelines.
5. Entry of the 4" (10 cm) pipes will not oppose one another.

   Example: 4 ft. of 6" O.D. (1.2 m of 15 cm O.D.) common supply air pipe and one 6"x4"x4" tee are attached to a 4" pipe x 4 ft. long, attached to VANTAGE® HE units. This will limit the flue length to 45 ft. of 4" (13.7 m of 10 cm) pipe.

▶Section 9. Gas Piping

⚠WARNING	
Fire Hazard	**Explosion Hazard**
Tighten gas line fittings to connect gas supply according to *Figure 28*. **Flex gas line can crack when twisted.** **Gas line moves during normal operation.** **Failure to follow these instructions can result in death, injury or property damage.**	**Do not high pressure test the gas piping with the burner connected.** **Failure to follow these instructions can result in death, injury or property damage.**

Read applicable warnings in Section 1 before proceeding with Gas Piping installation.

Meter and service must be large enough to handle all the burners being installed plus any other connected load. The gas line which feeds the system must be large enough to supply the required gas with a maximum pressure drop of 1/2" (1.3 cm) w.c. When gas piping is not included in the layout drawing the local gas supplier will usually help in planning the gas piping.

A 1/2" (1.3 cm) gas supply connection at each burner location must be located and oriented as shown in Figure 27. To check system pressure, put a plugged 1/8" (3 mm) NPT tapping in the gas line at the connection to the burner furthest from the supply. Before connecting the burners to the supply system, verify that all high pressure testing of the gas piping has been completed.

Follow these instructions to ensure a professional gas supply system installation:

- Support all gas piping with suitable pipe hanging materials.
- Use wrought iron or wrought steel pipe and malleable iron fittings. All pipe and fittings should be new and free from defects. Carefully ream the pipe and tubing ends to remove obstructions and burrs.
- Use LP-gas-resistant joint compound on all threads.
- Check the pipe and tubing ends for leaks before placing heating equipment into service. When checking for gas leaks, use a soap and water solution; never use an open flame.

Install the flex gas connector as shown. The flex gas connector accommodates expansion of the heating system and allows for easy installation and service of the burner.

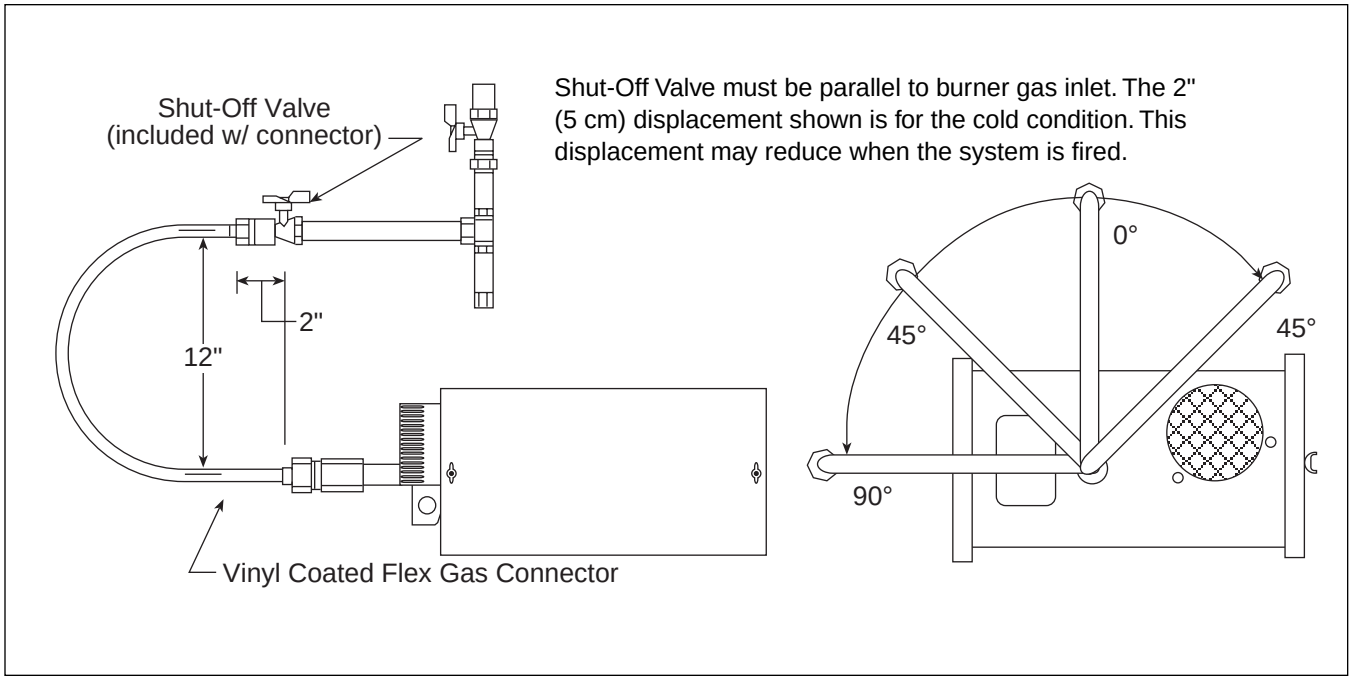

Shut-Off Valve
(included w/ connector)
Shut-Off Valve must be parallel to burner gas inlet. The 2" (5 cm) displacement shown is for the cold condition. This displacement may reduce when the system is fired.
2"
12"
Vinyl Coated Flex Gas Connector
0°
45°
45°
90°

Figure 28. Gas Line Connection with Stainless Steel Flex Gas Connector

▶Section 10. Wiring

⚠ WARNING		⚠ ATTENTION
Electrical Shock Hazard **Disconnect electrical power before servicing.** **Replace door before operating.** **Failure to follow these instructions can result in death or electrical shock.**		**Risque d'électrocution** **Débranchez le courant électrique avant toute révision.** **Replacez la porte avant la mise en marche.** **Le non-respect de ces consignes peut entraîner mort ou électrocution.**

Heaters can be controlled using several methods. Normally thermostats are used to control the heaters but they can also be controlled by an Energy Management System. Figure 29 illustrates the connection for heaters controlled by a line voltage thermostat NOTE: In order to use line voltage thermostats, the internal jumper connection located at the thermostat connections inside of each burner must be connected to the blue and purple wires shown on Figure 33. Figures 30a & b illustrate control schemes that incorporate a low voltage thermostat. For a single heater with a low voltage thermostat, use Figure 30a. If it is desired to control multiple heaters on one low voltage thermostat, then use Figure 30b. To control multiple heaters on one low voltage thermostat, the low voltage terminals on each heater must be connected to the internal jumper connection as shown in detail. Heaters must be grounded in accordance with applicable codes: United States: refer to National Electric Code ANSI/NFPA 70 - latest version Canada: refer to Canadian Electrical Code CSA C22.1 Part I - latest revision.

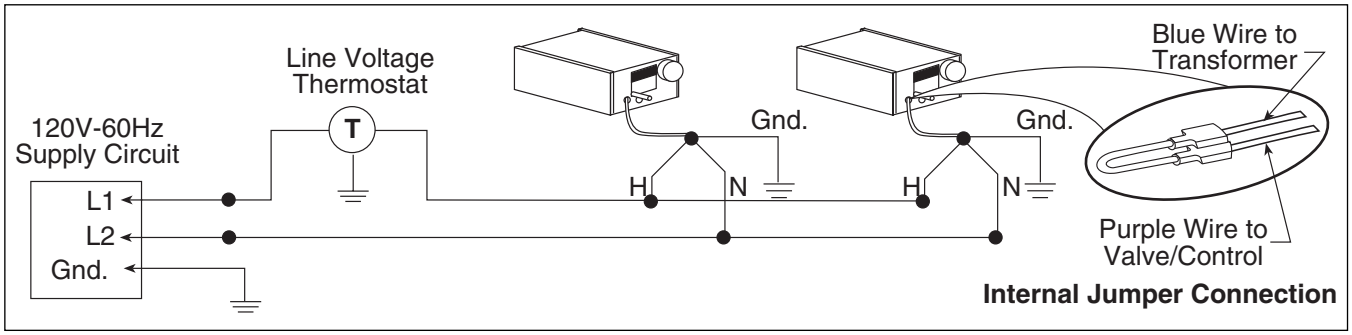


Figure 29. Line Voltage Thermostat Wiring

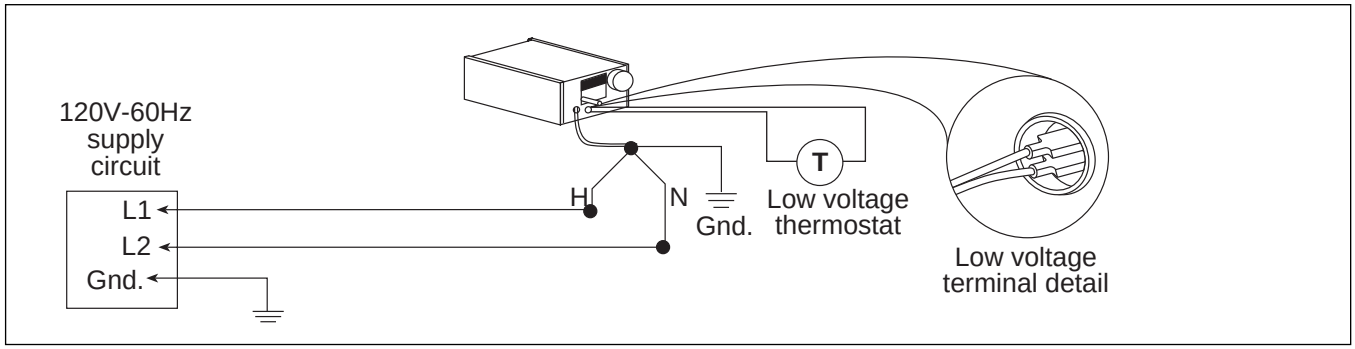


Figure 30a. Low Voltage Thermostat on One Burner

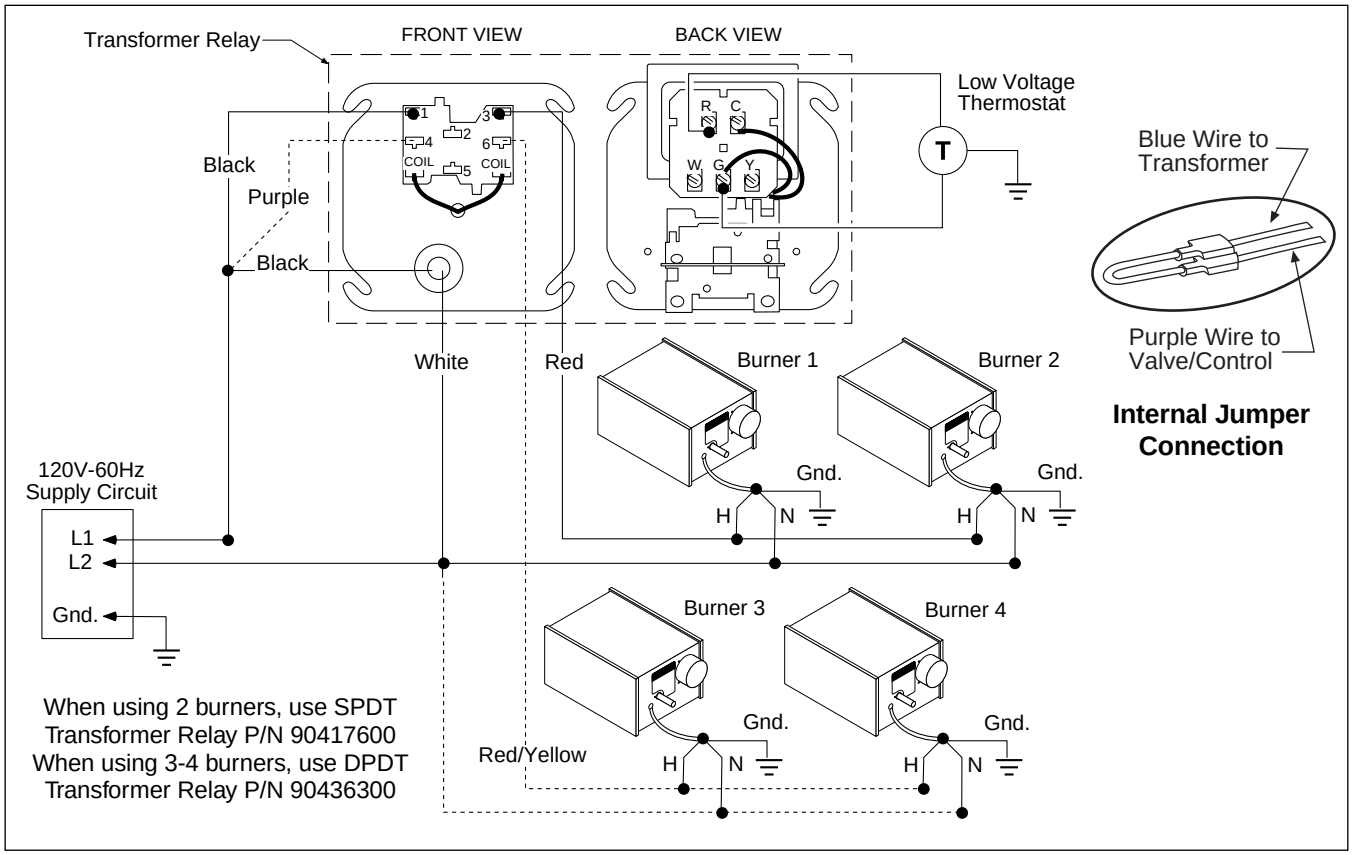


Figure 30b. Low Voltage Thermostat and Relay Wiring

⚠ WARNING	⚠ ATTENTION
If any of the original wire as supplied with the heater must be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C and 600 volts.	**Si une partie du câblage d'origine fourni avec le radiateur doit être remplacée, elle doit l'être par du matêriel de câblage tolérant une température d'au moins 105°C et 600 volts.**

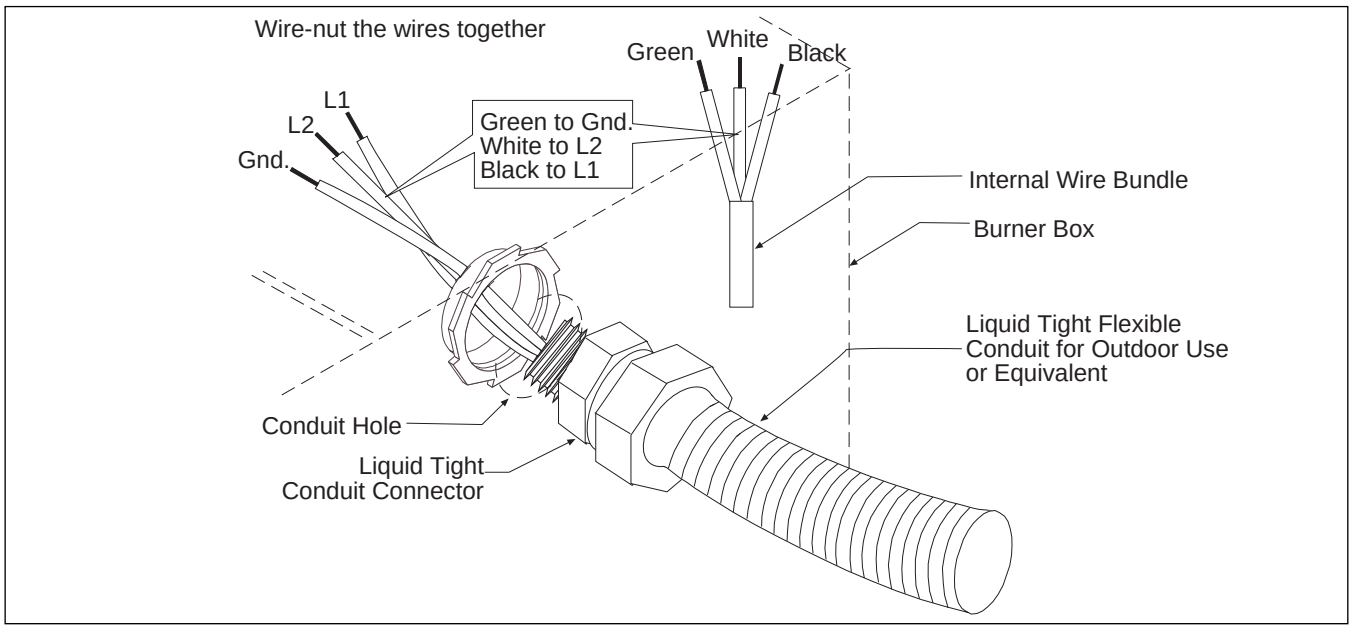


Figure 31a. Electrical Connection to the Burner Box using Line Voltage Thermostat on Control

⚠ WARNING	⚠ ATTENTION
If any of the original wire as supplied with the heater must be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C and 600 volts.	**Si une partie du câblage d'origine fourni avec le radiateur doit être remplacée, elle doit l'être par du matêriel de câblage tolérant une température d'au moins 105°C et 600 volts.**

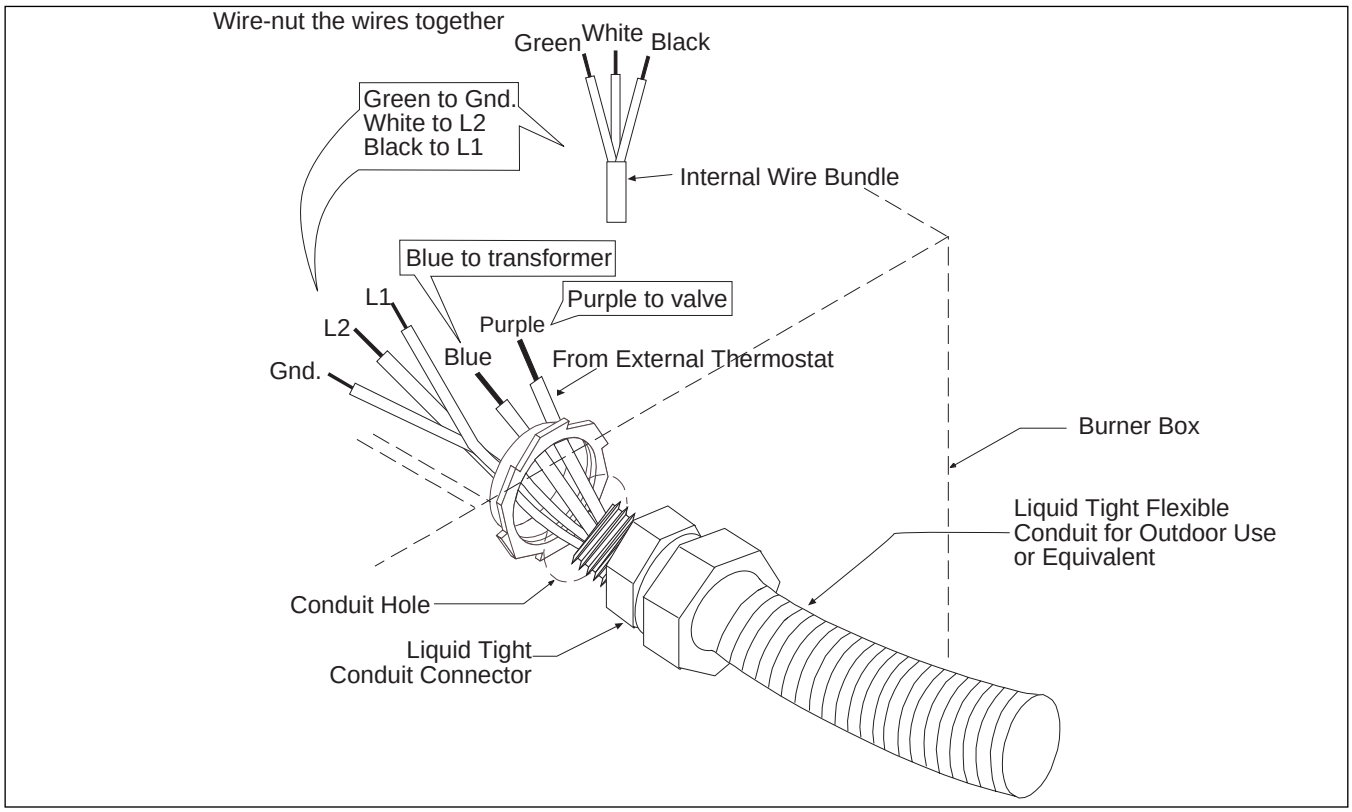


Figure 31b. Electrical Connection to the Burner Box with Optional External Low Voltage Thermostat

FOR EXTERNAL THERMOSTAT CONNECTION:

Run 2 wires from low voltage thermostat through conduit as shown. The purple wire from the valve and the blue wire from the transformer have 1/4" (6 mm) blade female electrical terminals, which are connected by a black jumper wire. Cut the female connections off the ends of the blue and purple wires and strip the ends approximately 1/2" (1.3 cm). Connect these 2 wires to the thermostat wires using suitable wire connectors.

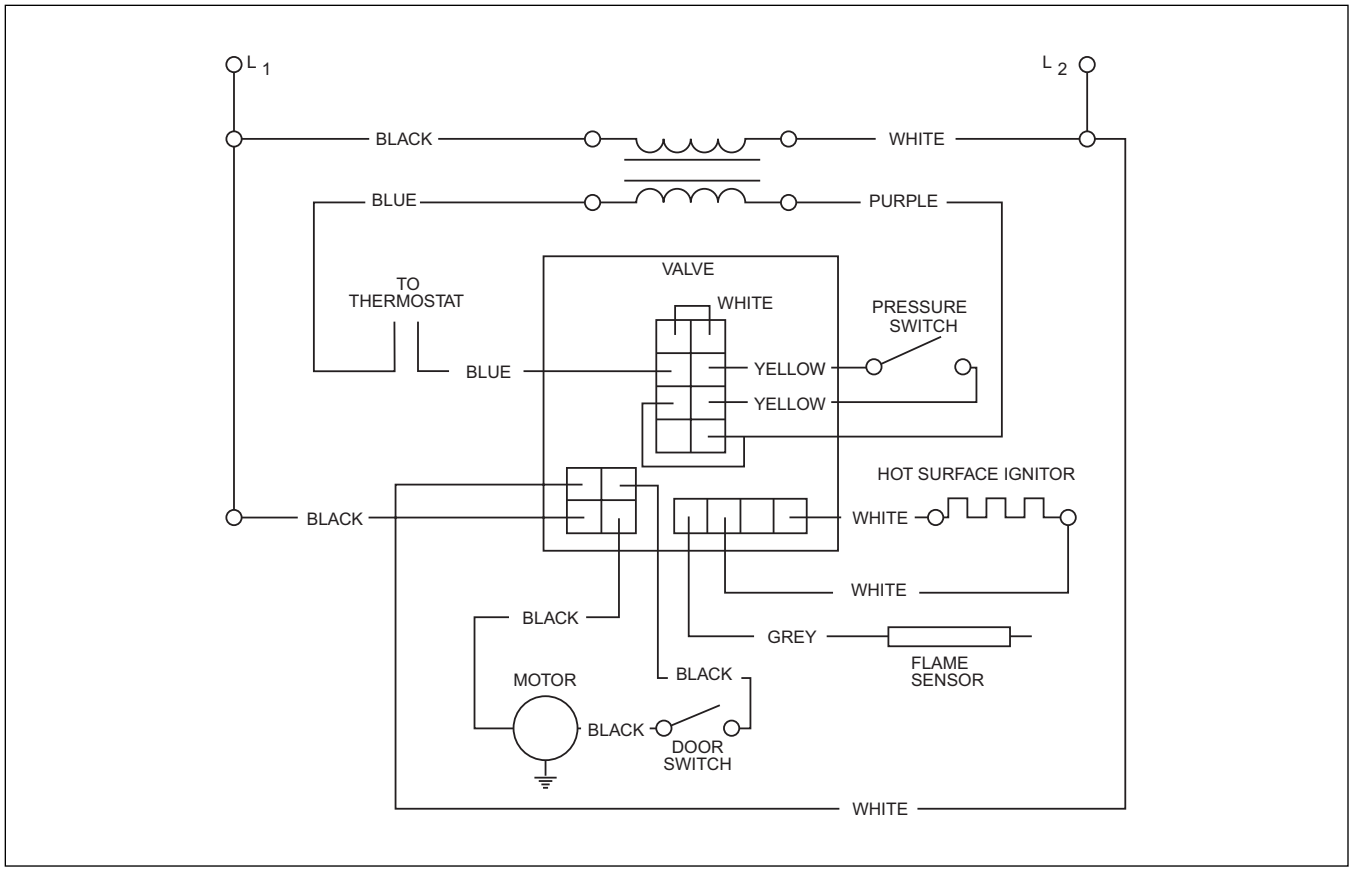


Figure 32. Burner Ladder Diagram

⚠ WARNING

If any of the original wire as supplied with the heater must be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C and 600 volts.

⚠ ATTENTION

Si une partie du câblage d'origine fourni avec le radiateur doit être remplacée, elle doit l'être par du matériel de câblage tolérant une température d'au moins 105°C et 600 volts.

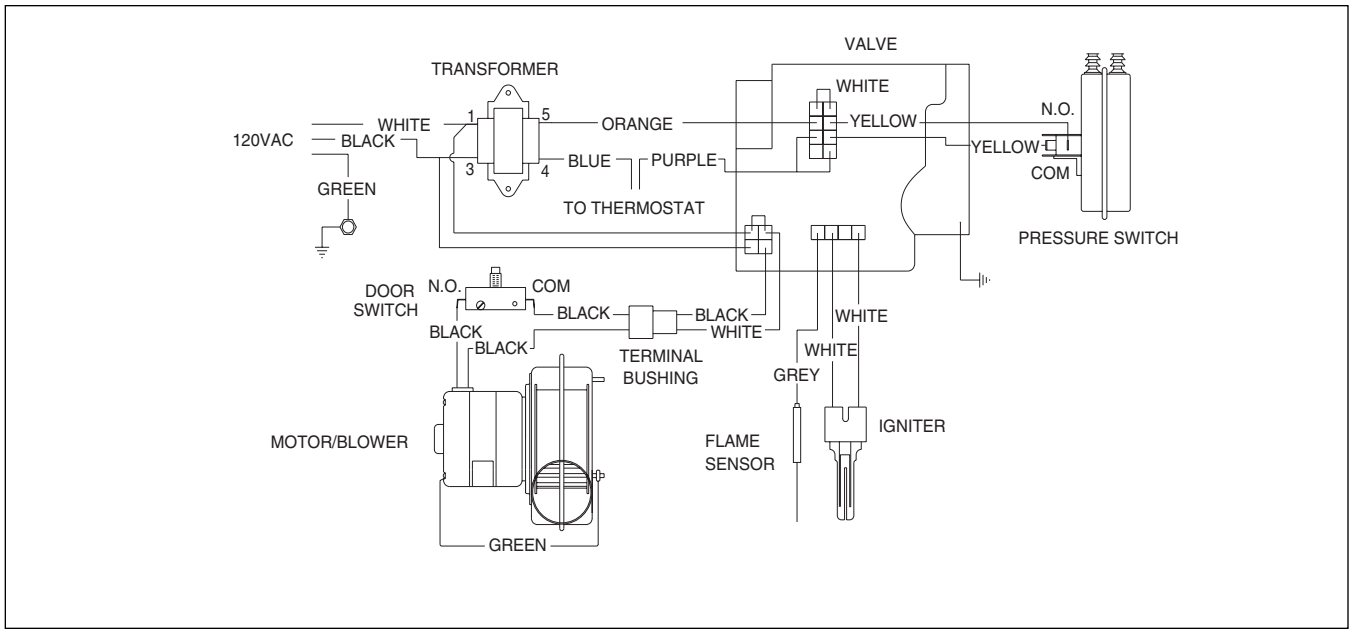


Figure 33. Burner Internal Wiring

▶Section 11. Operation

⚠ WARNING

Fire Hazard

Do not remove door while operating heater.

No user servicable parts inside.

Failure to follow these instructions can result in death, injury or property damage.

⚠ ATTENTION

Risque d'incendie

Ne pas retirer porte lors du foncionement du radiateur.

No contient aucune pièce réviasble par l'utillisateur.

Le non-respect de ces consignes peut causer mort, blessures ou dommage matériel.

The VANTAGE® HE heater is equipped with a hot-surface ignition system.

Sequence of Operation

1. Turn the thermostat up. When the thermostat calls for heat, the SmartValve® II will energize. After a short period, power is supplied to the blower motor.
2. When the motor approaches nominal running RPM, the pressure switch closes and signals the ignition module/SmartValve® II.
3. The ignition module/SmartValve® II then energizes the hot surface igniter for a timed warm-up period (approximately 45 to 60 seconds).
4. After the warm-up period, the gas valve is energized.
5. The flame will be sensed by the flame sensing rod and the igniter is de-energized.
6. If a flame is detected, the gas valve remains open. When the call for heat is satisfied, and the system control mechanism de-energizes the burner line voltage supply, the gas valve is turned off.
7. If no flame is detected on the module, the gas valve is closed, and a purge period begins. After the purge, the module acts to power the igniter for a second warm up period, and a second trial for ignition period. If flame is still not established, a third purge, warm up, and trial cycle begins. After four trials, the module will lockout until reset. Reset is accomplished by removing power from the module for at least 5 seconds (thermostat cycle required).

⚠WARNING

Disconnect gas and electrical supplies before performing service or maintenance.

Failure to follow these instructions can result in death, injury or property damage.

Maintenance

For best performance, the following maintenance procedures should be performed before each heating season:

1. Be sure gas and electrical supply to heater are off before performing any service or maintenance.
2. Check condition of blower scroll and motor. Dirt and dust may be blown out with compressed air, or a vacuum cleaner may be used.
3. Check condition of burner. Carefully remove any dust or debris from inside the burner box or burner cup.
4. Inspect the igniter. Replace igniter if there is excessive carbon residue, erosion, breakage or other defects.
5. Check the inside of the firing tube with a flashlight. If carbon or scale are present remove the turbulator(s). Scrape out the deposits with a wire brush or rod, or metal plate attached to a wooden pole and replace turbulator(s) in tube.
6. Check to see that the burner observation window is clean and free of cracks or holes. Clean or replace as necessary.
7. Check the flue pipe for soot or dirt. After cleaning as necessary, re-attach the flue pipe to the heater.
8. Outside surfaces of heater reflector may be cleaned by wiping with a damp cloth.
9. A qualified service agency should be contacted for service other than routine maintenance.
10. Check vent terminal and fresh air inlet to see that they have not become blocked during the non-heating season. If either pipe is restricted, the pressure switch won't close, resulting in a no-heat situation.

Outdoor

1. Clean any debris from top of tubes and reflectors.
2. Check for evidence of animals such as squirrels or birds and remove any nests prior to firing.

▶Section 12. Troubleshooting

⚠WARNING

Disconnect gas and electrical supplies before performing service or maintenance.

Failure to follow these instructions can result in death, injury or property damage.

This heater is supplied with the Honeywell® SmartValve® II control system. This system is equipped with a diagnostic function that will assist in performing troubleshooting. The LED (Light Emitting Diode) indicator at the top of the SmartValve® II control will flash in various patterns to indicate status. The LED status indication chart provided below gives a summary of possible faults.

LED STATUS	INDICATES
Off	No power to the control.
Bright-Dim	Normal operation. This indication shows whenever the system is powered, unless some abnormal event has occurred.
2 Flashes	Pressure switch remains closed longer than 30 seconds after a call for heat begins (pressure switch stuck closed).
3 Flashes	Pressure switch remains open longer than 30 seconds after combustion air blower is energized.
5 Flashes	Flame signal sensed out of proper sequence.
6 Flashes	System Lockout.

⚠WARNING

Electrical Shock Hazard

Do not disconnect ground leads inside heater.

Do not interchange grounded and ungrounded leads on transformer or ignition module.

Failure to follow these instructions can result in death or electrical shock.

Figure 34 on the next page will provide the information needed to test the manifold gas pressure setting. Figure 35 on pages 38 and 39 will take you through several troubleshooting steps to determine possible problems with the systems.

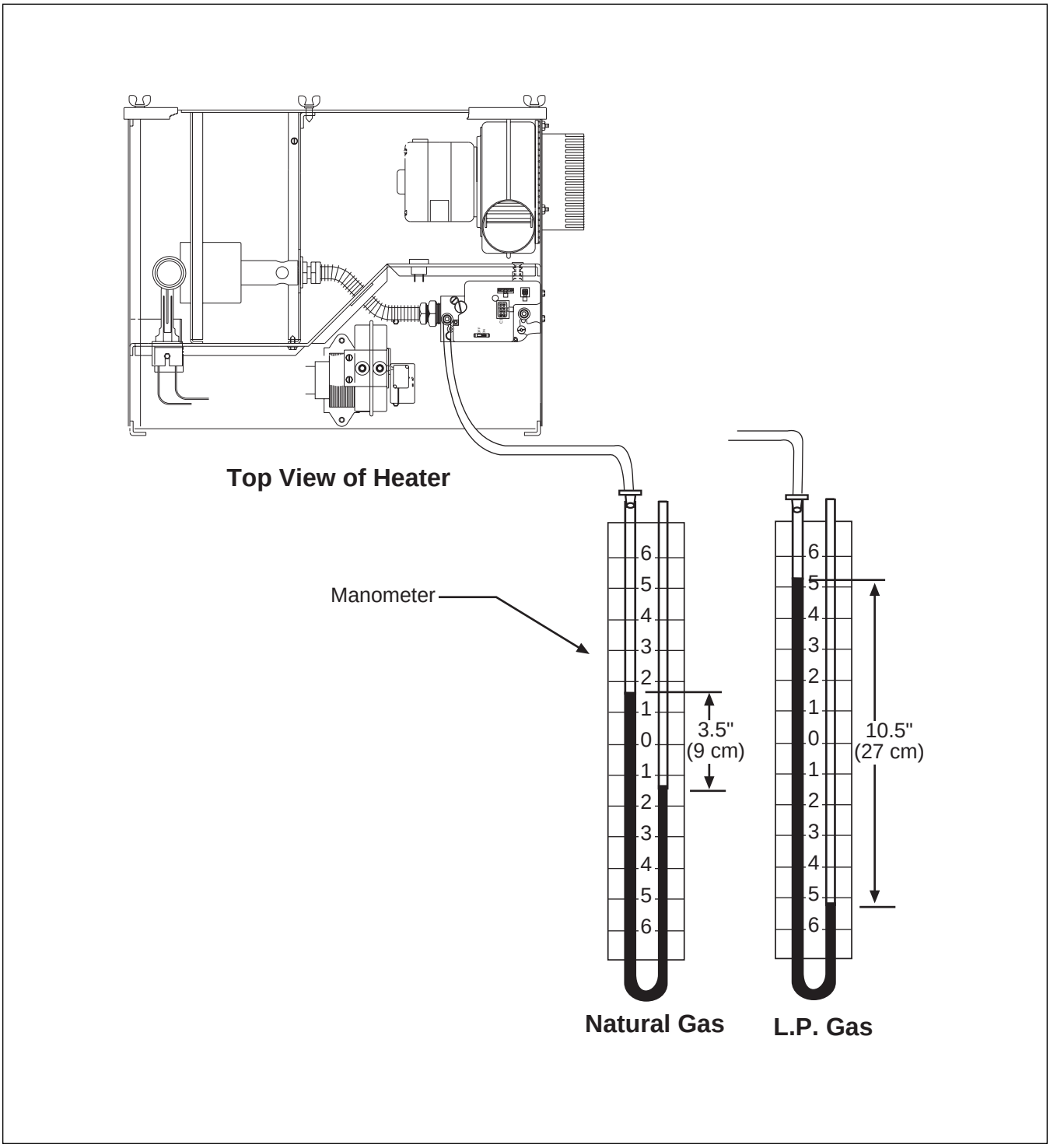


Figure 34. Checking Manifold Gas Pressure

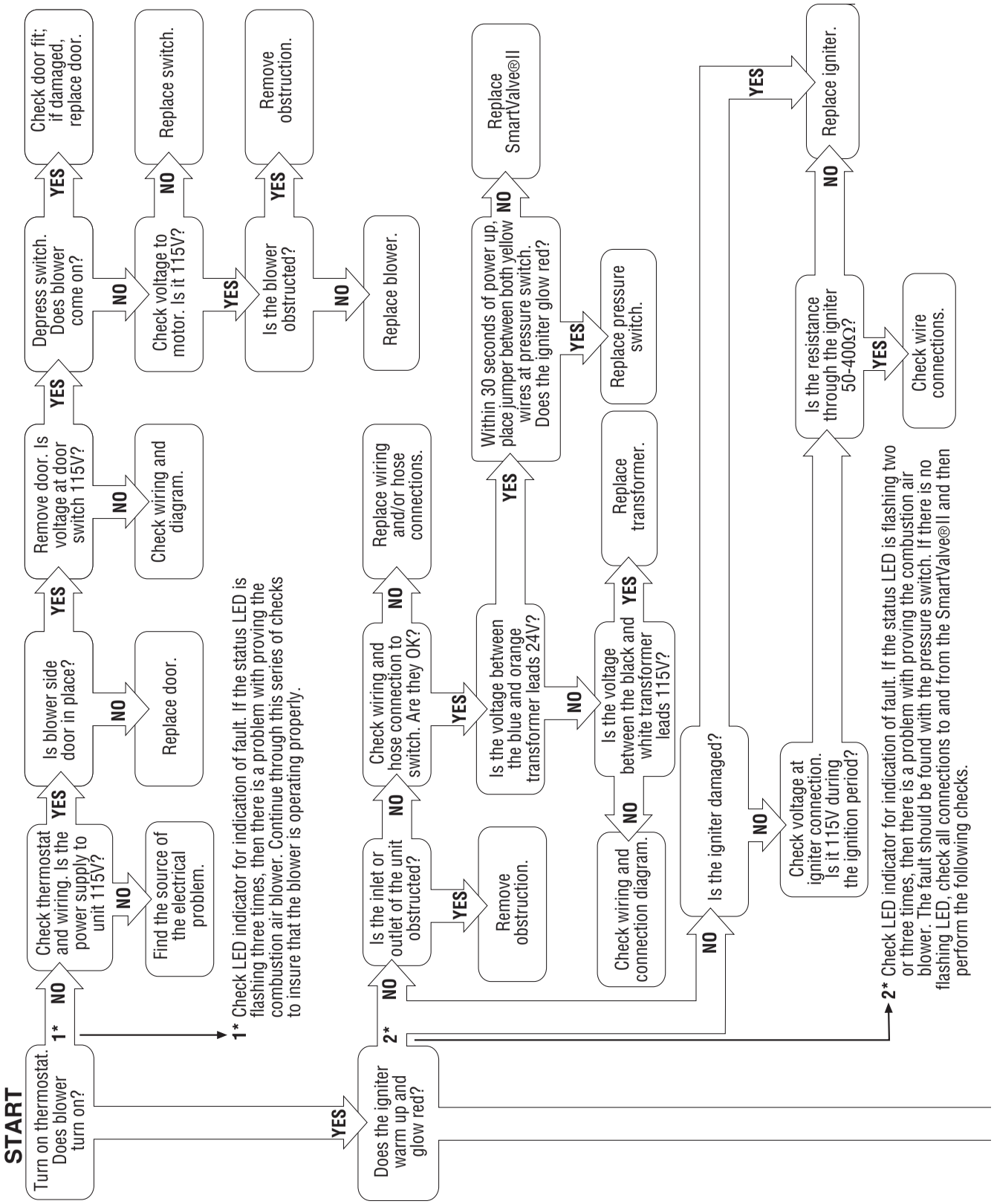
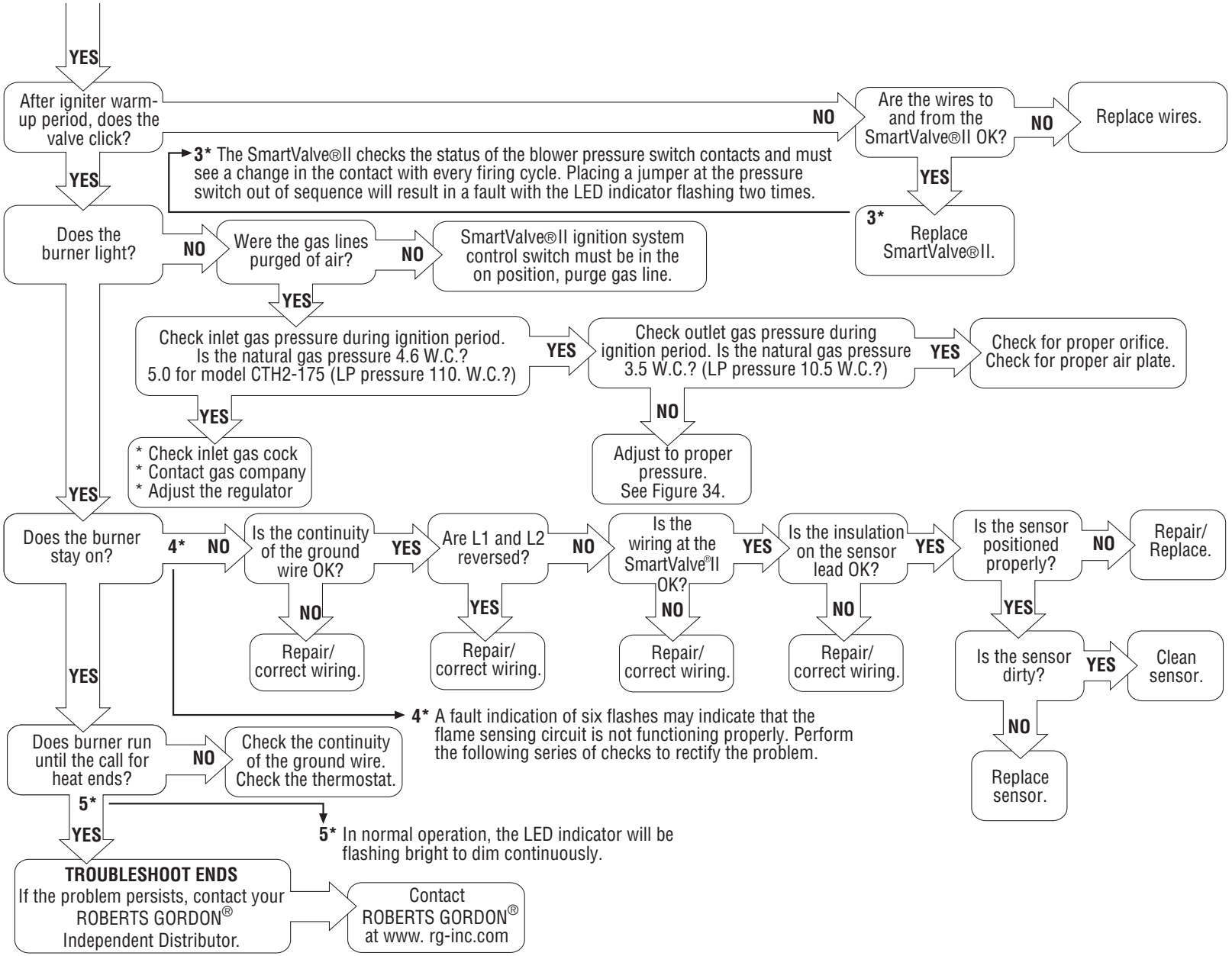

START
Turn on thermostat. Does blower turn on?
1*
NO
Check thermostat and wiring. Is the power supply to unit 115V?
YES
Is blower side door in place?
YES
Remove door. Is voltage at door switch 115V?
YES
Depress switch. Does blower come on?
YES
Check door fit; if damaged, replace door.
NO
Check voltage to motor. Is it 115V?
NO
Replace switch.
YES
Is the blower obstructed?
YES
Remove obstruction.
NO
Replace blower.
NO
Check wiring and diagram.
NO
Replace door.
NO
Find the source of the electrical problem.
1* Check LED indicator for indication of fault. If the status LED is flashing three times, then there is a problem with proving the combustion air blower. Continue through this series of checks to insure that the blower is operating properly.
YES
Does the igniter warm up and glow red?
2*
NO
Is the inlet or outlet of the unit obstructed?
YES
Remove obstruction.
NO
Check wiring and hose connection to switch. Are they OK?
NO
Replace wiring and/or hose connections.
YES
Is the voltage between the blue and orange transformer leads 24V?
YES
Within 30 seconds of power up, place jumper between both yellow wires at pressure switch. Does the igniter glow red?
NO
Replace SmartValve®II
YES
Replace pressure switch.
NO
Is the voltage between the black and white transformer leads 115V?
YES
Replace transformer.
NO
Check wiring and connection diagram.
NO
Is the igniter damaged?
YES
Replace igniter.
NO
Check voltage at igniter connection. Is it 115V during the ignition period?
NO
Is the resistance through the igniter 50-400Ω?
YES
Check wire connections.
2* Check LED indicator for indication of fault. If the status LED is flashing two or three times, then there is a problem with proving the combustion air blower. The fault should be found with the pressure switch. If there is no flashing LED, check all connections to and from the SmartValve®II and then perform the following checks.

Figure 35. VANTAGE HE® Troubleshooting Flow Chart


YES
After igniter warm-up period, does the valve click?
NO
Are the wires to and from the SmartValve®II OK?
NO
Replace wires.
YES
3* The SmartValve®II checks the status of the blower pressure switch contacts and must see a change in the contact with every firing cycle. Placing a jumper at the pressure switch out of sequence will result in a fault with the LED indicator flashing two times.
YES
3* Replace SmartValve®II.
Does the burner light?
NO
Were the gas lines purged of air?
NO
SmartValve®II ignition system control switch must be in the on position, purge gas line.
YES
Check inlet gas pressure during ignition period. Is the natural gas pressure 4.6 W.C.? 5.0 for model CTH2-175 (LP pressure 110. W.C.?)
YES
Check outlet gas pressure during ignition period. Is the natural gas pressure 3.5 W.C.? (LP pressure 10.5 W.C.?)
YES
Check for proper orifice. Check for proper air plate.
YES
* Check inlet gas cock
* Contact gas company
* Adjust the regulator
NO
Adjust to proper pressure. See Figure 34.
YES
Does the burner stay on?
4*
NO
Is the continuity of the ground wire OK?
YES
Are L1 and L2 reversed?
NO
Is the wiring at the SmartValve®II OK?
YES
Is the insulation on the sensor lead OK?
YES
Is the sensor positioned properly?
NO
Repair/ Replace.
NO
Repair/ correct wiring.
YES
Repair/ correct wiring.
NO
Repair/ correct wiring.
NO
Repair/ correct wiring.
YES
Is the sensor dirty?
YES
Clean sensor.
NO
Replace sensor.
YES
4* A fault indication of six flashes may indicate that the flame sensing circuit is not functioning properly. Perform the following series of checks to rectify the problem.
Does burner run until the call for heat ends?
NO
Check the continuity of the ground wire. Check the thermostat.
5*
YES
5* In normal operation, the LED indicator will be flashing bright to dim continuously.
TROUBLESHOOT ENDS
If the problem persists, contact your ROBERTS GORDON® Independent Distributor.
Contact ROBERTS GORDON® at www. rg-inc.com

▶Section 13. Replacement Parts

⚠ WARNING

Use only genuine ROBERTS-GORDON® replacement parts.

Failure to follow these instructions can result in death, injury or property damage.

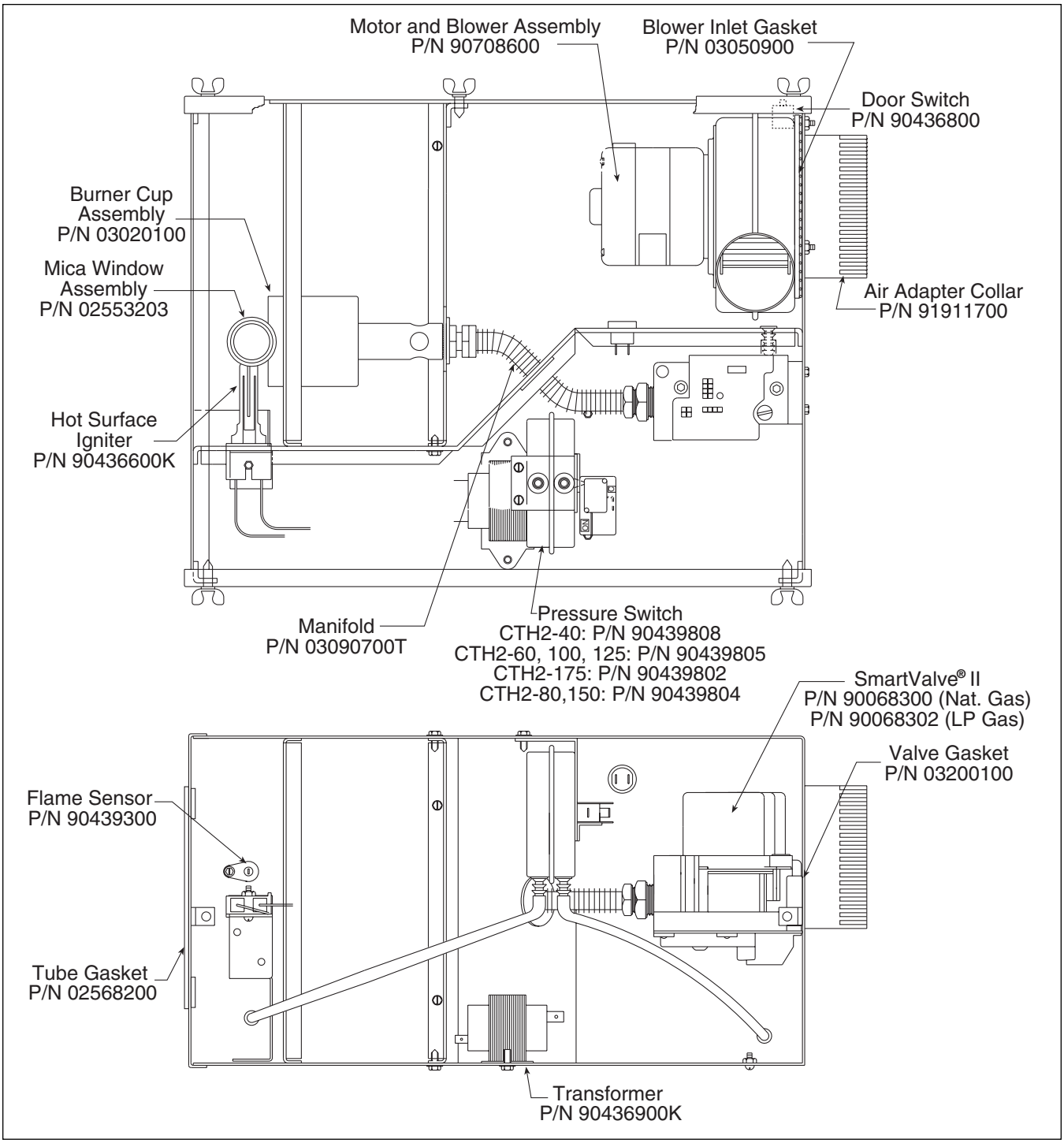


Figure 36. VANTAGE® HE Series Burner Replacement Parts

▶Section 14. Engineering Specifications

The total heating system supplied shall be design certified by the American Gas Association and the Canadian Gas Association and shall be approved for both indoor and outdoor installation.

A. Burner and Burner Controls

1. Burners shall be capable of firing with one of the fuel options as specified on the purchase documents: Natural Gas or LP.
2. Burners shall be supplied to fire at any one of the input firing rates as specified:

HE- 40	40,000 BTU/Hr.
HE- 60	60,000 BTU/Hr.
HE- 80	80,000 BTU/Hr.
HE-100	100,000 BTU/Hr.
HE-125	125,000 BTU/Hr.
HE-150	150,000 BTU/Hr.
HE-175	175,000 BTU/Hr.

3. Burners shall be equipped with a system control that combines gas flow control and electronic burner ignition sequencing functions into a single unit. This control shall provide all gas ignition safety functions by controlling gas flow, ignition source and the combustion air blower. The control shall also monitor the pressure switch to assure proper burner operation. Such control shall provide prepurge and timed trial for ignition with multiple ignition trials and auto reset from lockout. This control shall contain an LED indicator to provide system status.
4. Power supplied to each burner shall be 120V, 60HZ, single phase. Burners shall be rated for 1.0 Amp (run) 5.0 Amp (start).
5. Burner shall be equipped with thermal overload motor protection, balanced air rotor, combustion air proving safety pressure switch, and viewing window for flame observation.
6. When specified, in contaminated environments, the burner shall be capable of supplying outside air to each burner for the support of combustion.
7. At customer's choice, burners may be controlled with either an optional line voltage thermostat or by optional low voltage thermostats.
8. Burners shall be equipped with vinyl coated stainless steel flex gas connectors and the pipe connection shall be 3/4" NPT.
9. Gas inlet pressure shall be as follows:

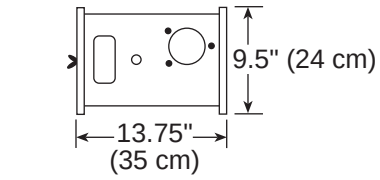
Natural Gas:	4.6" W.C. MIN, 14.0" W.C. MAX 5.0" W.C. MIN for HE-175,
LP Gas:	11" W.C. MIN, 14.0" W.C. MAX

B. Heat Exchanger

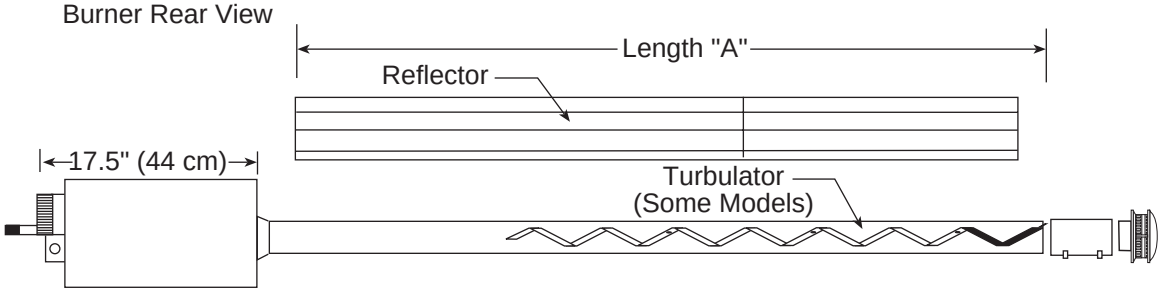
1. Radiant tubing shall be 4" diameter, 16 gauge, Alumi-Therm® Steel for the first 10', aluminized for the remainder of the unit. Sections shall be joined with stainless steel wrap-around couplings.
2. Reflector to be of .024 stainless steel, type 304 material and designed to direct all radiant output below horizontal centerline of radiant tube. Reflectors shall be certified for 0° or 45° mounting.
3. Reflectors shall have stainless steel end caps to prevent heat loss due to convection.
4. Steel turbulators to be used as specified for even heat distribution.
5. Heater to be vented according to manufacturer's instructions.

▶Section 15. General Specifications

General Specifications for VANTAGE® HE heaters are as follows:



Burner Rear View



Burner Side View

Model	Rate	Length "A"		Recommended Minimum Mounting Height* Space		Spot Indoor		Spot Outdoor	
		Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
HE- 40	40,000 Btu/hr	10	3	8 to 10	2.4 to 3.0	8	2.4	8	2.4
HE- 60	60,000 Btu/hr	20	6	10 to 12	3.0 to 3.7	9	2.7	9	2.7
HE- 80	80,000 Btu/hr	20	6	12 to 15	3.7 to 4.6	11	3.4	10	3.0
HE-100	100,000 Btu/hr	30	9	12 to 15	3.7 to 4.6	12	3.7	12	3.7
HE-125	125,000 Btu/hr	40	12	15 to 20	4.6 to 6.0	15	4.6	12	3.7
HE-150	150,000 Btu/hr	50	15	20 to 25	6.0 to 7.6	20	6	15	4.6
HE-175	175,000 Btu/hr	60	18	25	7.6	23	7	15	4.6

***Clearances to combustibles must be maintained in all cases.**

Gas Pressure at Manifold:

Natural Gas: 3.5" W.C.
LP Gas: 10.5" W.C.

Pipe Connection:

3/4" NPT

Dimensions:

Vent Connection Size: 4" (10 cm)
Outside Air Connection Size: 4" (10 cm)
Refer to figure above for dimensional information.

Gas Inlet Pressure:

Natural Gas: 4.6" W.C. Minimum (for HE 40,60,80,100, 125,150) 14.0" Maximum
5.0" W.C. Minimum (for HE-175) 14.0" Maximum

LP Gas: 11.0" W.C. Minimum 14.0" Maximum

Electrical Rating: (All Models)

120V, 60 Hz., 1.0 Amp (run) 5.0 Amp (start)

▶Section 16. VANTAGE® HE Limited Warranty

ROBERTS-GORDON WILL PAY FOR:
For 36 months from the date of purchase by the original consumer or 42 months from date of shipment by Roberts-Gordon, whichever occurs first: we will provide, free of charge, replacement parts for any part of the ROBERTS GORDON® VANTAGE® HE that fails because of a manufacturing or material defect.

ROBERTS GORDON® replacement parts are warranted for the period of the original ROBERTS GORDON® VANTAGE® HE Warranty.

ROBERTS-GORDON WILL NOT PAY FOR:

Service trips, service calls and labor charges.

Shipment of replacement parts.

Damage due to:

Failure to install, operate or maintain the ROBERTS GORDON® VANTAGE® HE as directed in Installation, Manual. You must follow requirements printed in this manual.

Misuse, abuse, neglect or modification of the ROBERTS GORDON® VANTAGE® HE in any way.

Improper service, use of replacement parts or accessories that are not specified by Roberts-Gordon.

Improper installation, or any relocation of the ROBERTS GORDON® VANTAGE® HE after initial installation.

Incorrect supply, accident, fire, flood, acts of God or other casualty.

Use of the ROBERTS GORDON® VANTAGE® HE for other than its intended purpose.

Use of the ROBERTS GORDON® VANTAGE® HE in a corrosive atmosphere or any atmosphere containing contaminants.

Shipping. Claim must be filed with carrier.

Use of the ROBERTS GORDON® VANTAGE® HE in the vacinity of combustible or explosive materials.

Any defect in the ROBERTS GORDON® VANTAGE® HE arising from a drawing, design or specification supplied by or on behalf of the consumer.

Failure of parts not manufactured by Roberts-Gordon in respect of any claim where the total price of the goods has not been paid.

WARRANTY IS VOID IF:

The ROBERTS GORDON® VANTAGE® HE is not installed by a contractor qualified in the installation and service of gas fired heating equipment.

You cannot prove original purchase date and required annual maintenance history.

The data plate and/or serial number are removed, defaced, modified or altered in any way.

The ROBERTS GORDON® VANTAGE® HE is transferred. This warranty is nontransferable.

Roberts-Gordon is not permitted to inspect the damaged burner and/or component parts.

READ YOUR INSTALLATION AND USE AND CARE MANUAL

If you have questions about your heater, contact your installing professional. Should you need Replacement Parts or have additional questions, call or write ROBERTS-GORDON®:

Canada
241 South Service Road, West
Grimsby, Ontario L3M 1Y7
905.945.5403

U.S.A.
1250 William Street
P.O. Box 44
Buffalo, New York 14240-0044
716.852.4400

On the web at:
www.rg-inc.com

Roberts-Gordon's liability, and your exclusive remedy, under this warranty or any implied warranty (including the implied warranties of merchantability and fitness for a particular purpose) is limited to providing replacement parts during the term of this warranty. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you. There are no rights, warranties or conditions, expressed or implied, statutory or otherwise, other than those contained in this warranty.

Roberts-Gordon shall in no event be responsible for incidental or consequential damages or incur liability for damages in excess of the amount paid by you for the ROBERTS GORDON® VANTAGE® HE. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

Roberts-Gordon shall not be responsible for failure to perform under the terms of this warranty if caused by circumstances out of its control, including but not limited to fire, flood, strike, government or court orders, unavailability of supplies, parts or power. No person is authorized to assume for Roberts-Gordon any other warranty, obligation or liability.

LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:

No representative of Roberts-Gordon, other than an Executive Officer, has authority to change or extend these provisions. Changes or extensions shall be binding only if confirmed in writing by Roberts-Gordon's duly authorized Executive Officer.